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ORIGINAL ARTICLES

ORTHODONTICS: A SURVEY*

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AS VISITORS, you have been welcomed by the Worshipful, the Mayor of Westminster. As a body of scientific men and women, you have been welcomed by His Majesty's Minister of Health. It is my privilege to welcome you on behalf of English dentists, as professional brothers and sisters, some known by name and reputation, others whose acquaintance has yet to be made, some already personal friends, and all, we hope, to become so before we part; for friendship and personal intercourse are not the least of the advantages of such a gathering as this.

Five years ago the first Orthodontic Congress was held in New York. It numbered over 750 and attracted men and women from all parts of the world. It was at this first Congress that the budding specialty of Orthodontics may be said to have become full blown and to have shown to the world the strength of its growth.

Those of you who were there will remember how great a success it was, how much there was to see and learn, and how it demonstrated, as never had been done before, the progress of orthodontics and the results attainable in the hands of its practitioners. You will agree that it set a standard of excellence not easy to attain, much less to surpass; but it is our hope that when we part five days hence you may, at least, be able to say that your time here has not been wasted.

And now let us suppose for a moment that we are asked what this Congress is all about, what is orthodontics, of what importance is it to the individual or the community? I think we might reply that, broadly speaking, it is the science and art concerned with the causes and treatment of malformations of

* Presidential Address delivered before the Second International Orthodontic Congress, London, July, 1931.

the jaws and irregularities in the position of the teeth, and that it is of great importance from social, economic, and hygienic standpoints.

Unsightly irregularity of the teeth may easily be the cause of an inferiority complex, with its lifelong disadvantages to the sufferer. Particularly in the case of a girl, it may seriously diminish the chances of marriage, possibly to the detriment of the community. It may put the subject at an economic disadvantage by rendering him or her less able to obtain employment, and by altogether ruling him out of certain kinds of employment where personal appearance is of importance. In severe forms it may affect speech, and so again carry with it one or all of these disabilities.

It may be prejudicial to health in one or more of several ways. The jaws and the teeth are at their highest efficiency as a masticating machine only when each tooth is in proper relation to its opponent, and any deviation therefrom must, in proportion to its gravity, impair that efficiency. Certain malrelations of the jaws cause mouth-breathing with all its ill effects on health and growth. Crowding of the teeth, by disturbing the natural juxtaposition of the curvatures of adjacent teeth, leads to the lodgment of food and so helps to induce caries, and caries is one of the most serious scourges of mankind.

The presence here today of practitioners from the four corners of the earth is a proof that orthodontics is a matter of world-wide concern, confined to no nation and no clime. At once the questions arise: Why are irregularities of the teeth so prevalent? Were they always so? What causes them? The latest attempt to answer these questions has been made by Professor Brash of Birmingham in a series of lectures given under the aegis of the Dental Board of the United Kingdom, and I am indebted to these lectures for much of the material on which I have based the remarks that follow:

Malocclusion of the teeth is, and always has been in the past, a concomitant of civilization. It is prevalent in all civilized communities today, and it is probably roughly correct to say that the more advanced the civilization, in other words, the more artificial the conditions under which people live, the greater the percentage of persons affected. Among savage races living under primitive conditions it is very rare to any marked extent. As man advances from the savage state it occurs oftener, though in minor degrees. "The early forerunners of modern man bear abundant evidence of it," says Hellman, and in fact very frequent examples are to be found in any collection of ancient skulls. Keith tells us that "Abiotrophic changes had overtaken the dental system of the Western Europeans as early as the neolithic period" and "may have increased during the more recent centuries."

Malocclusion is essentially a problem of growth, and just as it occurs early in the history of the race, so does it occur early in the history of the individual. For long, the trend of opinion has been increasingly towards this belief, the belief that the causes of malocclusion, apart from what I may call accidental causes, such as "comforters," thumb-sucking, postural habits, the premature loss or too long retention of deciduous teeth, lie much deeper and much farther back than we used to think, that they are not to be found entirely or even chiefly in the mechanical effects on the growing child of concomitant conditions such as mouth-breathing, but that they are bound up both with nature and with nurture.

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Irregularities of the second set of teeth are foreshadowed in the first, and even at birth future malrelation of the jaws may often be detected.

But malocclusion of the teeth is not confined to the human family. Sir Frank Colyer, as a result of an exhaustive study of more than 20,000 animal skulls in all parts of the world, tells us that every form of dental irregularity to be found in man has its counterpart in the lower animals. He finds, moreover, that it is commoner in some genera than in others, that among animals of the same genus it is commoner in one species than in another, and among the same species commoner in some places than in others, and specially common in captive and domestic animals. "There is," says Colyer, "an inherent tendency to variation, and this tendency is accentuated by altered environment such as the change, in the case of animals, from a wild to a captive state, and in the case of man from savage to civilized conditions. In other words the development of abnormalities other than those traceable to accidental causes such as injury, sepsis, etc., is due to the universal tendency of living things to vary. This tendency may be held in restraint or may remain in abeyance, or, it may be quickened into greater activity by altered environment." Distoclusion, with accompanying projection of the maxillary front teeth, long ago seized upon by the continental caricaturist as an English characteristic, is one of these variations, and my impression is that it is becoming increasingly common in this country. Sexual selection may have something to do with this, for the rather narrow maxilla, the maxillary teeth just in evidence, the dimple above the chin associated with this condition in its less pronounced forms may give the face a character which undoubtedly has attractions of its own; indeed it has been stated by a woman who ran a canteen in France during the war, and was assisted by various young women, that those with this pecularity invariably got married; and another very observant woman tells me that she has noticed that it is exceptional to meet women with jaws so formed who have remained single. Does it not appear as if there were in the environment of civilized man, primitive man, and the lower animals, some common factor, of wide distribution, but affecting civilized man most? Such a factor is to be found in food. We know from the experiments on dogs made by Mrs. May Mellanby in this country, and on monkeys by Dr. Percy Howe in the United States, that diets deficient in certain vitamins profoundly affect the growth of the jaws, giving rise to malocclusion of the teeth, and that similar diet fed to the mother will produce similar results in the offspring.

We know that the percentage of the vitamin content in plants varies with climatic conditions, that the mineral content varies with the soil. May not a diet deficient in some essential be the cause of faulty bone growth in the lower animals, or at least a factor in the cause, and does it not seem the more probable when we find among the same species of animals a much larger percentage of cases in some districts than in others?

If that be so with wild animals, how much more so with man, who no longer subsists on a natural diet but has become a cooking animal! The more civilized he becomes the more he cooks, until today only a very small portion of his diet is unmodified by art. He lives on foods prepared and treated in a hundred different ways, and all he takes in its natural state may be a little

salad, a little fruit and a little milk, and, as likely as not, the cow producing the milk was fed on cake.

I know of no statistics of comparison between the prevalence of malocclusions among the various nations, and I would suggest that here is a fruitful field for investigation, but I do know from personal observation that fifteen years ago German soldiers had far better formed jaws than English soldiers. May it not be, partly at any rate, because the German baby is fed from its mother's breast, while the English baby is too often fed on condensed milk from a bottle, and the German man and his mother so often eat black bread, while the Englishman and his mother eat white?

But the cookery of civilization has done more than to alter the nutritive qualities of our food, it has altered its texture; so that less muscular force is needed for mastication. The savage will chew cartilage as easily as we chew chocolate, and enjoy the exercise. The possessor of the finest set of teeth I ever saw told me that he got no pleasure out of eating meat that was not tough, but he was the only person I ever heard say so; civilized man in general insists on having his meat tender. Nature, adapting means to need, is reducing the jaws of civilized man accordingly, for "form is the result of functional activity." (Lamarck.) Both jaws and teeth are becoming smaller, but the jaws more rapidly than the teeth.

These changes, however, are not universal, and, says Keith, "some modern faces are as good as the old ones." So it would seem that hereditary and nutritional factors both play their part. It is the opinion of Brash that "it by no means follows that they are mutually exclusive, and that changes in the mode of growth of the bone induced in the individual by external factors, such as lack of vitamins or alteration of diet leading to diminution of function of the jaws, may not in the end acquire an hereditary basis."

"All this evidence," he says, "not merely narrows the main field to a question which may be briefly characterized as one of Nature or early Nurture, but in fact strongly points to Nature rather than Nurture."

"An hypothesis that irregularity and malocclusion of the teeth are in a broad sense inherited conditions, that they depend upon genetic factors, would seem at this stage to be a reasonable starting point and guide for further inquiry."

As our etiologic outlook has broadened so have our views of treatment. In pre-Angle days it was mainly individualistic and was governed chiefly by esthetic considerations. There was no general guiding principle. Each case presented a problem of its own, and for the main part each practitioner employed a method of his own, a method mainly mechanical. This is not to say that great progress had not been made; on the contrary, many famous men had laid the foundations on which we build today, and every mechanical method and every type of apparatus used now had its germ and beginning long ago.

The occlusion of the teeth was first described in detail by John Hunter in his "Natural History of the Teeth," published in 1771, and he recognized its influence in their arrangement.

Duval, a Frenchman, writing a little later, says, "It is not sufficient that the teeth are properly arranged by the side of each other. Those of the upper jaw have a special connection with those of the lower, the least deviation from

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which diminishes the beauty of the appearance, frequently renders their functions laborious, and may often tend to their mutual destruction,'' but it was reserved for Edward Angle to emphasize to the full the importance of occlusion, to establish correct occlusion as the ideal at which all must aim, and so to evolve order out of chaos, and to give a new trend to orthodontic thought and practice.

Like King Solomon before him who sang to his beloved,

> ''Thy teeth are like a flock of ewes that are newly shorn,
> Which are come up from the washing,
> Whereof every one hath a twin,
> And none is missing among them.''

he recognized that thirty-two teeth in perfect occlusion are the perfection of beauty, and he realized that beauty is the visible sign of physiological efficiency.

Like most men who leave a mark on their profession he was an enthusiast, and in his enthusiasm he made this ideal of normal occlusion a fetish, a fetish perhaps still worshipped by some of his more devoted followers. He believed that once the thirty-two teeth were placed in their correct relative positions, sufficient development of supporting bone would invariably follow to make the retention of the ideal position permanent, and he built up a school of thought and practice upon this foundation. He did more: in order to carry out his principle to the full he developed the technic of the fixed appliance which goes by his name.

For some years his teaching was widely accepted in its entirety, but always with considerable reservation in England, for we are a steady-going people, not inclined to accept a new gospel until well authenticated. In course of time experience proved that these dogmas were only partly true, and that, in spite of the utmost technical skill and its conscientious application, relapses occurred far and wide.

''If you can get 50 per cent of your cases to stay nice, you are doing wonderful work,'' said Harvey Stallard, speaking before the New York Society of Orthodontics in October, 1929. (International Journal of Orthodontia, Oral Surgery and Radiography, May, 1930.)

Today treatment is on broader lines. Extraction is no longer invariably stigmatized as mutilation, but recognizing as we now do that our means of stimulating bone growth are, in any case limited, and nonexistent after physiologic growth has ceased, it is regarded as necessary where the growth of the jaws remains insufficient to accommodate a full denture.

''Taking all the factors into consideration, it would seem that in cases of biologic disharmony, the inflexible rule of striving in all cases for a denture with a full complement of teeth is both untenable in conception and impracticable in application,'' said Andrew Jackson. (International Journal of Orthodontia, Oral Surgery and Radiography, January, 1929.)

Nor is diagnosis the simple matter that Angle taught, and, in the opinion of an increasing number of orthodontists, the use of anthropometric methods, such as those advocated by Campion, Simon, Schwarz and others, is necessary for its full elucidation.

In treatment, while the technic of mechanical appliances has reached a pitch of perfection that can hardly be surpassed, there is a growing tendency towards the use of physiologic methods to assist or in some cases to replace them entirely. I need only mention the work of Rogers, Friel, Izard and others in investigating the effect of muscular action and utilizing it in treatment by means of muscle exercises, and the very remarkable results sometimes obtained. To some their aims and ideas may seem Utopian, but I would remind you in the words of Rogers that "the very soul of science lies in that kind of imagination which constantly extends the limits of the possible." (INTERNATIONAL JOURNAL OF ORTHODONTIA, ORAL SURGERY AND RADIOGRAPHY, April, 1925.)

To quote Brash once more, "The progress of Medical Science is in these days to be measured not so much by mere advances in the treatment of disease as by the extent of the knowledge, physiologic and etiologic, which enables us to substitute a rational for an empirical basis of treatment . . . . that knowledge which in medical science not only enables us to substitute more effective rational for less effective empirical treatment . . . . but may also give us the power to translate into action the proverbial wisdom that 'Prevention is better than cure.' " (Brash, Dental Board Lectures, 1930.)

Prevention may one day be possible; in some measure I believe that it will. Today in England I think that we do not see the gross malocclusions which were common fifty years ago, and the worst cases are to be found in the poorest classes. May not the improved standard of living, more food, and better food, be a reason?

The young people of today are a physically fitter race than the generation which preceded them, thanks to the application of the discoveries of science to everyday life, better houses, better sanitation, better food, better knowledge of the laws of health and better appreciation of the value of physical culture. Succeeding generations should be better still. The mothers having received proper care during pregnancy should produce well-formed, vigorous offspring, and these nourished first on their mother's milk, and later on food nutritious in quality and hard enough to give the muscles of mastication full exercise, may be expected to grow strong teeth in well-formed jaws. It will take some time before this happy state of things becomes general, and for many years to come there will be plenty of scope for the art of the orthodontist, exercised, more and more, I believe on physiologic lines, and less on mechanical.

There will still remain the hereditary causes of malocclusion going far back in the history of the race, the result of man's discovery of cooking, and as I see no prospect of man's ever giving it up, I fear that unless Nature reduces the number or size of his teeth there will still be need, if not for the orthodontist, for the exodontist, perhaps for both.

The orthodontist has gone far in devising and applying methods for the correction of malocclusion and, I believe, will go farther and on less empirical lines; but his ideal must ever be prevention. To achieve it he needs vision, and must look beyond the individual to the race.

Many questions await solution. The work of this and subsequent congresses may help to provide the answers.

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TISSUE CHANGES INCIDENTAL TO ORTHODONTIC TOOTH MOVEMENT*†

By A. Martin Schwarz, M.D., Vienna, Austria

PART I. HISTORICAL

THE first investigator who systematically experimented on animals with orthodontic appliances and investigated the results histologically was the Swede, Carl Sandstedt. In 1904 he reported[1] the following experiment (Fig. 1). A labial arch was placed on the six maxillary incisors of a dog. Bands were placed on the canines with small horizontal tubes in which the arch was fixed. Distally to the tubes were screws drawing the arch backward. Thus the arch pressed the incisors lingually, while the canines were drawn mesially. This experiment lasted three weeks. During this time the crowns of the central incisors were moved about 3 mm. lingually.

The modern orthodontist may object that in this experiment the forces used were too strong and were intermittent. But in the first place, Sandstedt drew the screws only a little each day so that the force used was practically constant. Second, as Fig. 1 *E* shows, the strong force affected the different teeth with varying intensity. Third, the movement of a single tooth by a strong tilting force must also produce all degrees of biologic effects from the strongest to the weakest force. For the pressure of the tooth acting against the alveolus decreases as it approaches the axis, where the force is zero. Therefore, as shown in Fig. 2, in different cross-sections of the root, different forces are acting. Sandstedt examined the teeth in cross-sections and thus obtained the various biologic gradations. In this way he obtained the histologic results of the effect of various forces, and in this fact lies the great value of his experiment from the standpoint of modern histology.

The result of Sandstedt's investigations was as follows (Fig. 3):

1. On the side of pull, with both weak and strong forces, a deposition of bone takes place on the old alveolar wall. The newly formed bone spicules follow the direction of the strained peridental fibers (Fig. 3 *E*). One can distinguish precisely the limit between the newly formed bone and the old alveolar bone (Fig. 3 *E* at G); the latter is not changed.

2. On the side of pressure the old alveolar bone is equally resorbed by weak forces (Fig. 3 *C*). The surface of the tooth itself remains intact.

By these fundamental findings Sandstedt was the first to ratify the pressure theory of Flourens also for the orthodontic movement of teeth.

3. By strong forces the peridental soft tissue is compressed at first on the side of pressure and cannot resorb the old alveolar bone, because it is deprived of its vitality. Instead of this, an active resorption soon begins in the neighboring marrow spaces of the alveolar bone; so the bone and the compressed soft tis-

* From the Department of Histology (Prof. B. Gottlieb) of the Institute for Dentistry (Prof. H. Pichler) University, Vienna.

† Read at the Second International Orthodontic Congress, London, July, 1931.

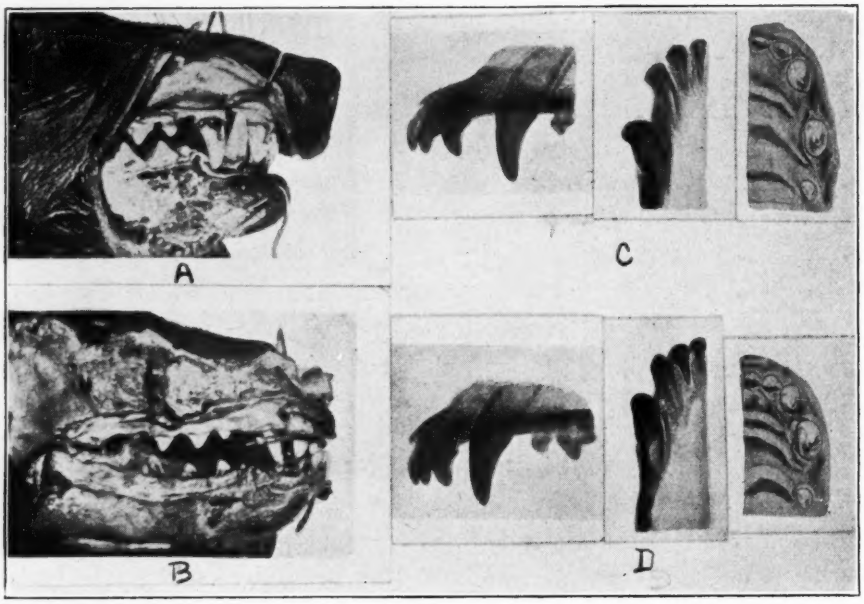


Fig. 1*A-D*

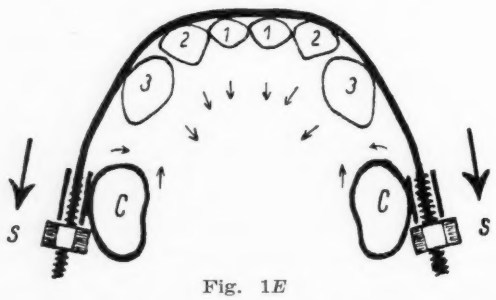


Fig. 1*E*

Fig. 1.—Sandstedt's experiment on a dog. *A*, Appearance of the dog's jaws before the appliance was inserted. *B*, Appearance of the dog's jaws after the experiment; the mandibular canines were removed before the experiment so as not to prevent the movement of the maxillary teeth. *C*, Radiograms and plaster cast of the jaw before the experiment. *D*, Radiograms and plaster cast of the jaw after the experiment. *E*, Sketch of the appliance used: *1, 2, 3*, the six incisors; C, canine; s, the screw on the labial arch behind the tubes. The arrows show the movement of the single teeth.

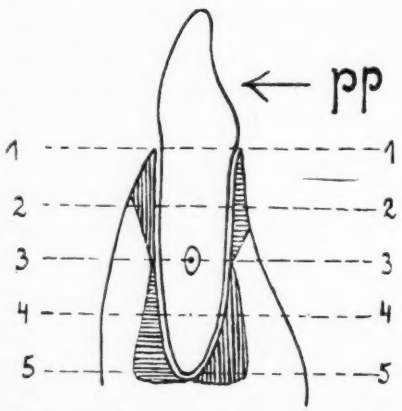
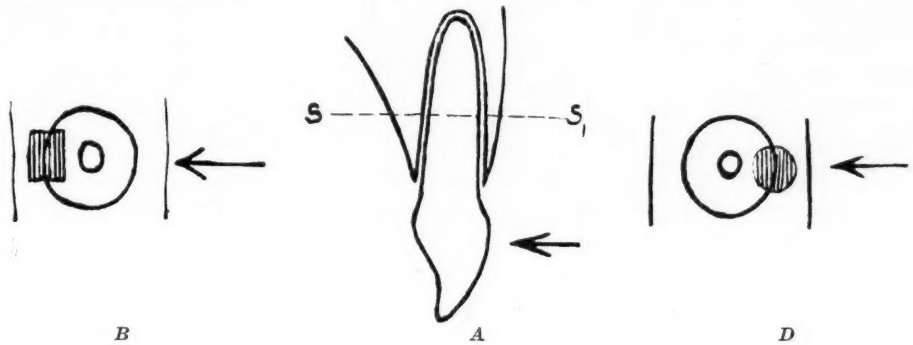
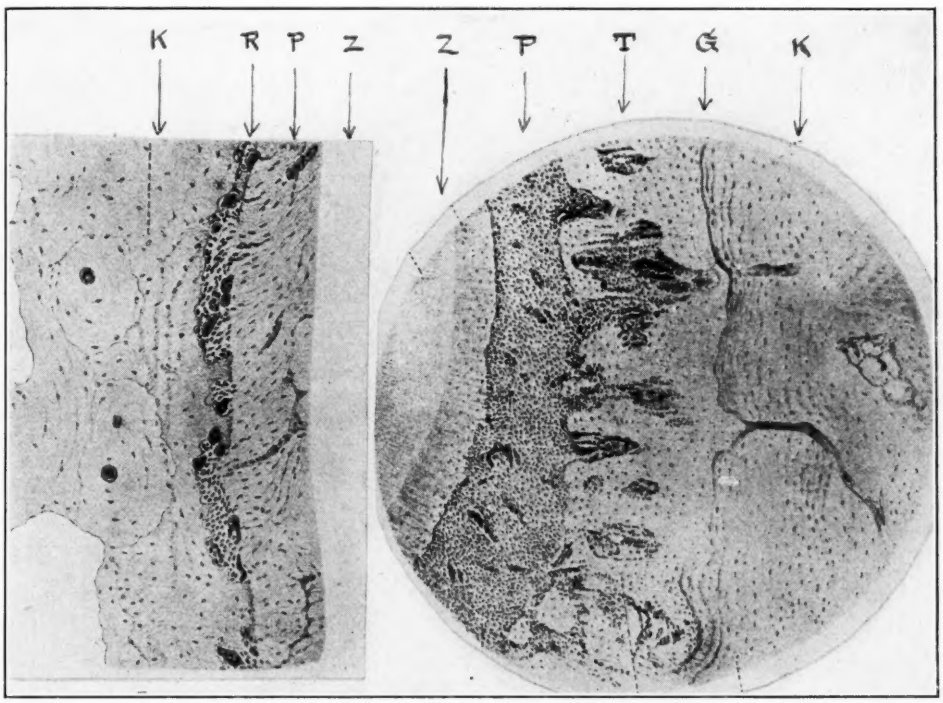


Fig. 2.—As the result of a strong tilting force (pp) applied to a tooth, all gradations of the force are exerted in different zones of the root. With a strong force the tilt axis, O, lies about in the middle of the root ("diagonale Verklemmung"). There are two regions of pressure (vertically shaded) and two regions of pull (horizontally shaded), lying diametrically opposite each other. The greatest force acts in the zones 1 and 5 (margin and apex); a much smaller one acts in the zones 2 and 4 (nearer the center), no force at all in zone 3 (center of the root).

sue in the region of the greatest pressure are removed. When all the necrotic material is removed, the tooth assumes at one pull a new position. Sandstedt calls this process *the undermining resorption.* This very interesting biologic reaction of the alveolar bone explains the fact that by the use of strong forces orthodontic results also are obtained.



B *A* *D*



C *E*

Fig. 3.—Sandstedt's histologic findings on the influence of a weak force. *A.* Sketch of the tooth under observation. Arrow, direction of the force; ss', approximate level of the histologically described cross-section.

B. Sketch of the cross-section of the side of pressure; the region subjected to pressure in *C* is shown by shading.

C. Side of pressure; at Z the surface of the tooth is to be imagined. P, compressed, but nucleiferous periodontium; R, line of resorption with numerous osteoclasts, in Howship's lacunae; K, old compact alveolar bone with haversian systems; there is no transformation here.

D. Sketch of the cross-section of the side of pull; the region subjected to pull in *E* is shown by shading.

E. Side of pull. Z, surface of the tooth (dentine and cementum); P, periodontium with numerous nucleiferous cells; T, newly formed bone trabeculae in the direction of pull, between them are newly formed marrow spaces; G, limit between the newly formed bone and the old compact alveolar bone, K; there is no transformation.

Six years after Sandstedt's publication, Oppenheim's well-known findings were published.[2] These differ widely from Sandstedt's findings. The chief difference appears in the following statement:[3]

The lamellae of the compact alveolar bone become opened out as the result of weak forces, by the influence of pressure and pull on both sides of the moved tooth; and the bone transforms itself into a transitional spongiosa, the elements of which are arranged in the direction of force. Fig. 4 represents diagrammatically the difference between the conclusions of Sandstedt and Oppenheim. The left-hand sketch (*A*) shows Sandstedt's conclusion, the arrow indicates the force acting on the tooth, the gray shadow parts are the old alveolar bone. The tooth tilts in the bone around the axis O, lying usually a little apically from the center of the length of the root. The jagged lines of the alveolar wall are

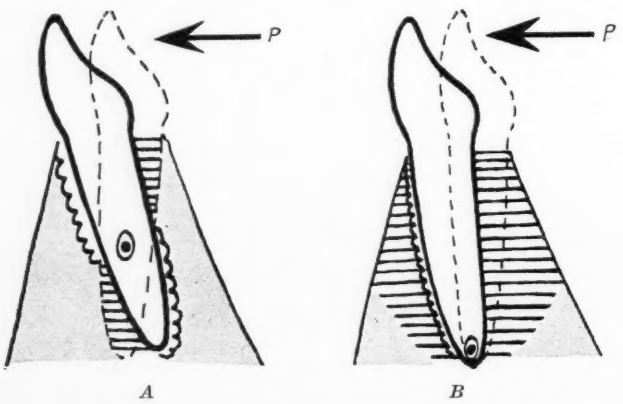


Fig. 4.—Diagrams: *A*, theory of pressure (Sandstedt, 1904), and *B*, theory of transformation (Oppenheim, 1911 and 1928).

A. The tooth moved by the force, P, tilts around an axis, O, lying a little apically from the center of the root. By this means two regions of pressure and pull arise, lying diametrically opposite. In the regions of pressure the old alveolar bone is resorbed (jagged line) in the regions of pull new bone is added (horizontal shading). Gray shading, alveolar bone without transformation.

B. The tooth moved by the force, P, tilts around on axis, O, lying on the apex. Therefore, there is only one side of pressure, and one side of pull. On both sides the alveolar bone opens into a transitional spongy bone, whose elements are arranged vertically to the surface of the tooth (horizontal shading). On the side of pull this newly formed transitional bone is resorbed (jagged line). On the side of pull new bone is added. Gray shading, the old untransformed alveolar bone at a greater distance from the moved tooth.

the places of pressure where resorption takes place. The horizontally shaded parts of the peridental space are the regions of pull on which the new bone is formed.

The right side (*B*) shows Oppenheim's conclusions. The tooth tilts, as Angle says, from the apex. The horizontally shaded parts are the transformed alveolar bone, both on the side of pressure and on the side of pull. On both sides of the moved tooth the alveolar bone is transformed over a wide area around the tooth. The elements of the new bone are arranged on both sides in the direction of force. The newly formed alveolar bone on the side of pressure is resorbed along the jagged line.

In order to decide which of these two conclusions is right, it is now necessary to consider Oppenheim's findings in further detail. As is known, Oppenheim experimented on the teeth of a baboon. One incisor was moved by an Angle arch and ligature labially, another one lingually. After forty days of the movement the result was examined histologically.

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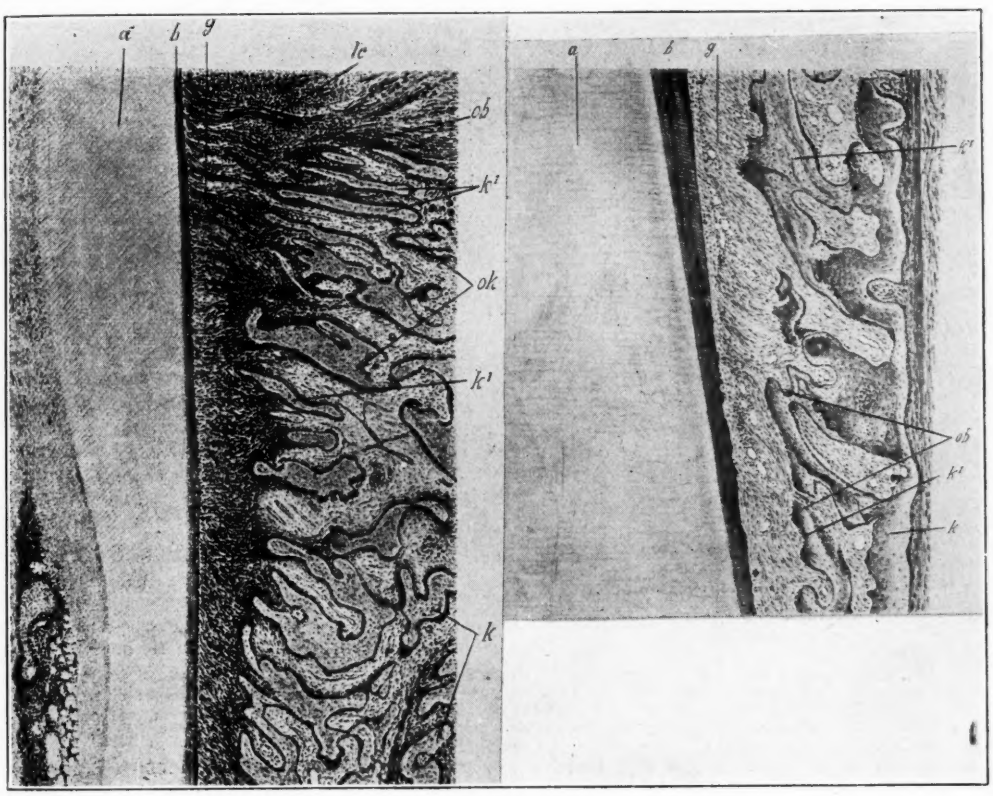
Fig. 5 shows the side of pull of the moved teeth near the alveolar margin. Just as in the findings of Sandstedt there appear the newly formed bone trabeculae. Oppenheim did not see in his objects the limit between the old and the new bone so distinctly as Sandstedt did, and assumed, therefore, that the old alveolar bone had transformed itself.

A *C*



B *D*

Fig. 5.—Oppenheim's experiments, side of pull.

A. Sketch of tooth moved labially; the region subjected to pull in *B* is shown by shading.

B. Newly formed bone trabeculae in the direction of pull of the strained periodontal fibers: a, dentine; b, cementum; g, the strained periodontal fibers; lc, ligamentum circulare; k', newly formed bone trabeculae; ob, osteoblasts; ok, osteoclasts.

C. Sketch of tooth moved in a palatal direction; the labial region subjected to pull in *B* is shown by shading.

D. Picture almost identical with *B*. The findings are the same as those of Sandstedt in Fig. 3 *E*. Markings are the same as those in *B*.

Fig. 6 shows the side of pressure of both moved teeth near the alveolar margin. Both histologic illustrations are drawings. In the year 1928 Oppenheim published photographs[4] from the same section series to prove the correctness of the drawings. (The reproduction of histologic slides by photographs was not yet in use at the time of his first publication.) I shall refer to these photo-

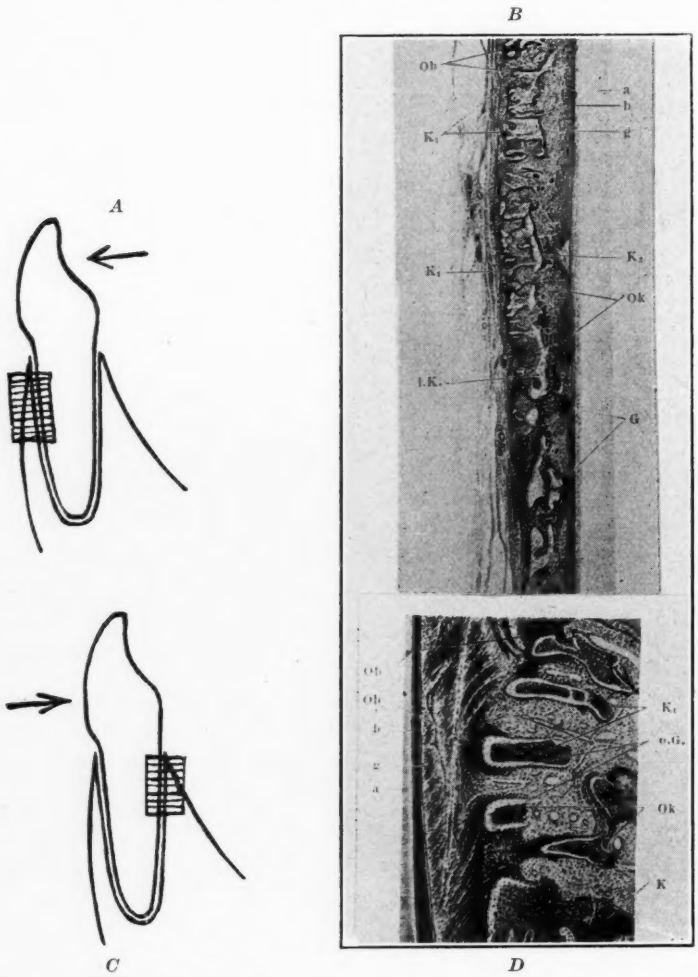
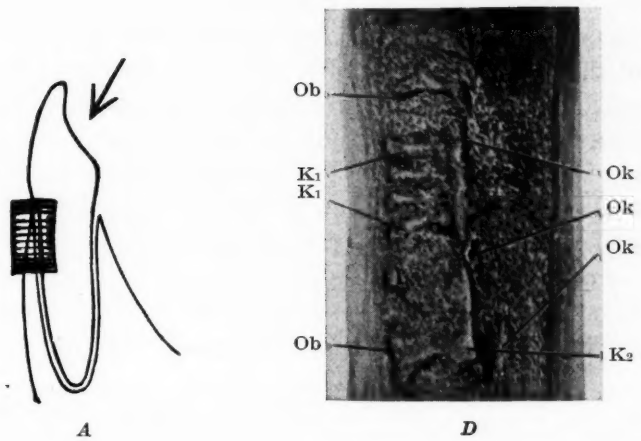
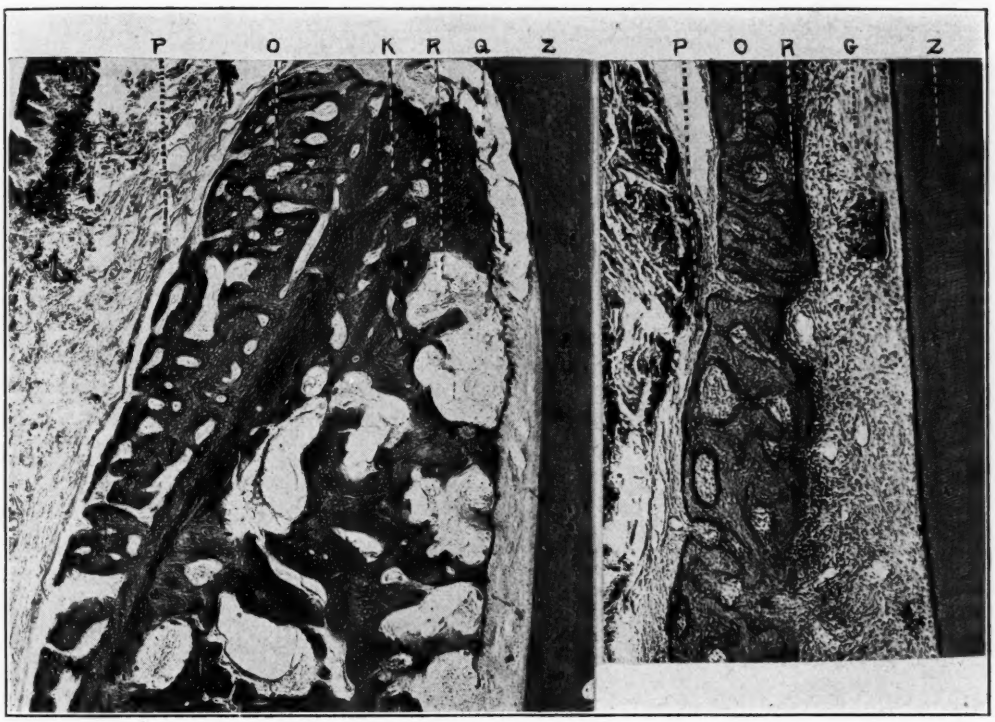


Fig. 6.—Oppenheim's experiments, side of pressure.
A. Sketch of tooth moved labially; the labial region subjected to pressure in *B* is shown by shading.
B. In place of the old alveolar bone there are newly formed bone trabeculae, arranged vertically to the surface of the tooth (drawing from the year 1911): a, dentine; b, cementum; g, compressed periodontium; G, blood vessels; l.K., old lamellar aleovar bone; K_1, newly formed bone trabeculae; Ob, osteoblasts; Ok, osteoclasts; K_2, remains of compact bone that has already lost the lamellated structure.
C. Sketch of tooth moved in a palatal direction; the region subjected to pressure in *D* is shown by shading.
D. There are also in place of the old alveolar bone some bone trabeculae, arranged vertically to the surface of the tooth. The light edges (o.G.) are newly formed osteoid tissue; otherwise the markings are the same as in *B* (drawing from the year 1911).

graphs later (Fig. 7 *D* and 10 *A*). In Fig. 6 *B* is shown the labial side of the tooth moved labially, in Fig. 6 *D* the lingual side of the tooth moved lingually. How can we explain these pictures? For the interpretation of the first picture, the latest investigations of Gottlieb and Orban[5] give us the explanation. These authors have experimented with dogs, effecting a traumatic occlusion by putting



A *D*



B *C*

Fig. 7.—Osteophytes on the marginal outer surface of the alveolar bone according to Gottlieb and Orban.

A. Sketch of a carnassial tooth pressed obliquely in the direction of the arrow. The region subjected to pressure, shown by shading, is enlarged in Fig. 7 *B*.

B. Marginal side of pressure; Z, tooth; Q, point of compression of the periodontium; K, old alveolar bone; O, osteophytes; P, periosteum; R, marrow spaces showing undermining resorption.

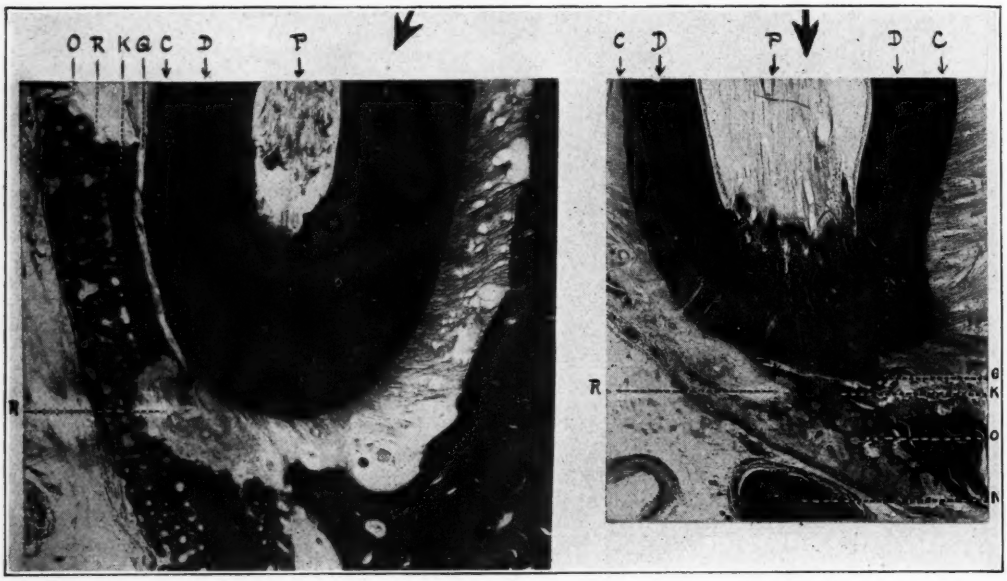
C. A similar experiment, but a later stage than that shown in *B*. Z, tooth; G, pressed periodontium including a small residuum of the old alveolar bone; O, osteophytes; R, line of resorption on the periodontal side of the osteophytes; P, periosteum. (From Gottlieb and Orban, *Die Veränderungen der Gewebe bei übermässiger Beanspruchung der Zähne.*)

D. Oppenheim's photograph of the marginal pressure side of the tooth moved labially; nearly identical picture with that of *C*. K_1, newly formed bone trabeculae; Ob, osteoblasts; Ok, osteoclasts; K_2, old alveolar bone.

crowns upon the carnassial teeth, and found the following: On the outer surface of the alveolar bone, namely, on the periosteal side, arise so-called "osteophytes" as a reaction of the bone to the excessive pressure. The elements of this new bone are arranged for the most part vertically to the surface of the jaw bone.

In Fig. 7 such osteophytes are shown. The tooth of Fig. 7 *B* was pressed in the direction of the arrow (Fig. 7 *A*). The histologic slide corresponds to the shaded area in the sketch (Fig. 7 *A*). There we see new bone on the outer surface of the jaw, while the part of the old alveolar bone, lying close to the periodontium, is actively resorbed.

Fig. 7 *C* shows the same kind of experiment as in Fig. 7 *B*, but continues for a longer time. There is nothing more of the old alveolar wall. In its place are



A *B*

Fig. 8.—Osteophytes on the outer surface in the apical region of the alveolar bone (from Gottlieb and Orban).

A. Influence of a strong force in the direction of the arrow: P, pulp; D, dentine; C, cementum; K, old alveolar bone; O, osteophytes; Q, region of compression of the periodontium; R, region of resorption stretching over the newly formed osteophytes.

B. The osteophytes, O, were formed in the lumen of the canalis mandibuli (N, nervus mandibularis). At the region of compression the old alveolar bone, K, is removed by the undermining resorption, R. The young osteophytes were also attacked by the latter. Arrow and also P, C and D as in *A*.

only newly formed osteophytes in the course of resorption on the side of the tooth. Fig. 7 *D* is Oppenheim's photograph of the marginal pressure side of the tooth moved labially, published in 1928. The agreement of this photograph with Fig. 7 *C* is evident. There is no doubt that both pictures show identical occurrences.

In Fig. 8 *A* the osteophytes were formed on the outer surface of the mandible near the apex of a tooth which was pressed in the direction of the arrow. We see here how the old alveolar wall, K, was already partially resorbed up to the osteophytes; even those were subjected to resorption at the spots, R. Fig. 8 *B* shows a tooth pressed apically in the direction of the arrow. Here the osteophytes were formed in the lumen of the canalis mandibuli and in this state were affected over again by the resorption.

In all these pictures (Figs. 7 and 8) we find as a common condition regions of compression in consequence of strong forces, by which apparently the deposition of osteophytes is effected.

In this way we obtain the following diagrammatic picture of Oppenheim's experiments (Fig. 9): On the left (*A*) we see the first stage. The tooth was tilted with the crown in the direction of the arrow labially, the axis was a little below the middle of the root. The regions of pull, where the new bone is added, are shown by dotted lines; the regions of pressure, where the old alveolar bone is resorbed, are shown by jagged marking; but at the same time the very thin labial alveolar wall forms osteophytes on the outer surface. On the right (*B*) we see the second stage. The thin wall of old bone on the labial alveolar margin

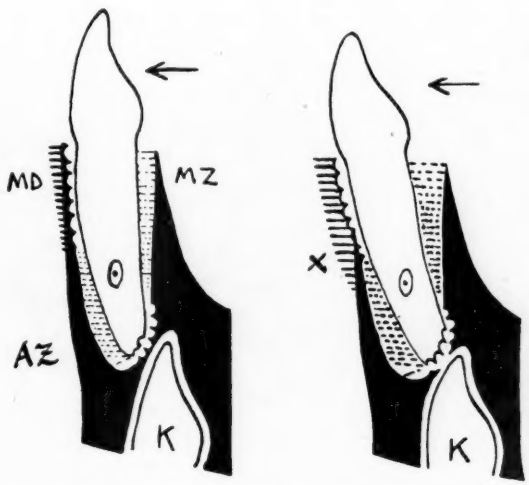


Fig. 9.—Sequence of events in Oppenheim's experiment of the labial movement shown diagrammatically in two stages.

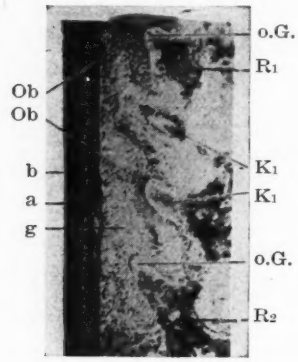
A. First stage. The deciduous incisor, moved labially in the direction of the arrow, has tilted itself round the axis, O. In the marginal region of pressure, MD, the resorption (jagged line) of the thin alveolar wall has taken place, and reactively new osteophytes on the labial side were formed, which were arranged vertically to the surface of bone. In the apical region of pressure the apex of the deciduous tooth soon encountered the germ of the permanent tooth (K) and was also attacked by the resorption. In the marginal region (MZ), as well as in the apical region of pull (AZ), new bone trabeculae (dotted line) were formed, which were arranged vertically to the surface of the tooth.

B. Second stage. In the sequel of the movement of the tooth, the thin old alveolar wall disappeared in the marginal region of pressure, and the newly formed osteophytes were also resorbed. In the apical region of pressure the resorption was progressing both on the bone and on the apex of the moved deciduous tooth. In both regions of pull the deposition of the new bone trabeculae advanced. Then the tooth was almost surrounded with new bone, which was arranged vertically to the surface of the tooth. So the alveolar bone seemed to be transformed both on the side of pressure and on the side of pull. Only at the level of the axis, at X, old alveolar bone is still in contact with the alveolus; this spot corresponds to the spot K_2 of Fig. 7 *D*.

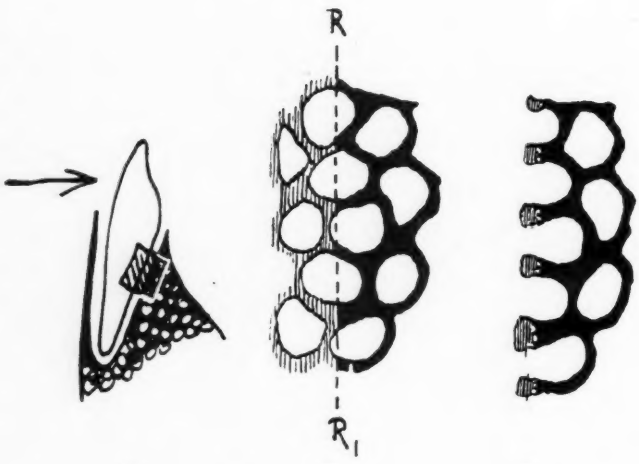
is already quite resorbed, and the newly formed osteophytes were also affected by the resorption.

How can we explain the histologic slide on the side of pressure of the lingually moved tooth (Fig. 6 *D*)?

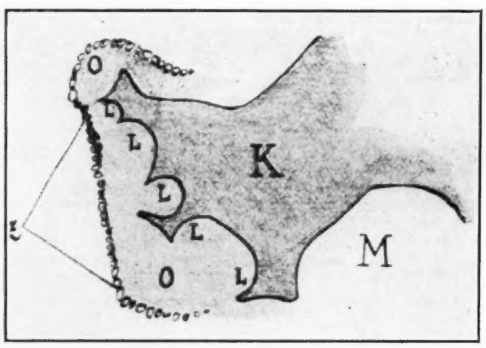
Fig. 10 *A* shows Oppenheim's photograph of the marginal pressure side of the tooth moved lingually. It corresponds to the shaded part of Fig. 10 *B*. The arrow shows the direction of the force. The lingual alveolar wall consisted here of a coarse-meshed spongiosa. The marrow cells of this spongiosa were opened by the resorption, and in some stages the walls of these marrow cells remained in a form similar to that shown in Fig. 10 *C*. Of course the wall consists of old



A



B *C* *D*



E

Fig. 10.—Diagrams of Oppenheim's experiment of the lingual movement.

A. Oppenheim's photograph of the marginal side of pressure of the tooth moved lingually: a, dentine; b, cementum; g, periodontium; R_1 and R_2 (not delineated by the author), line of resorption covered with osteoid tissue o.G.

B. Sketch of the movement of the tooth; the arrow shows the direction of force. The shaded area is the region of tissue shown in *A*.

C. Diagram of the lingual alveolar spongiosa which was resorbed along the line RR_1, while some marrow cells were opened.

D. The opened marrow cells along the line of resorption with bone walls are arranged vertically to the tooth. The repairing apposition of osteoid tissue after fading away of the ligature activity is indicated by shading.

E. The upper bone spicule of *A*, point R, is shown in diagram; K, old spongiosa spicules; M, marrow space in the old alveolar bone; L, vacant Howship's resorption lacunae; O, osteoid border; Z, row of osteoblasts.

alveolar bone. But Oppenheim described this old alveolar bone as a newly formed bone, set vertically to the direction of pressure, because the free ends were surrounded by thick osteoid borders (Fig. 10 *A* and *D*). Whence came these osteoid borders?

Oppenheim used ligatures, that is, intermittent forces. Several days after the last tightening of the ligatures, the animal was killed. Now it is known that a ligature is only effective during about the first two days after it is adjusted; during this time it causes an active resorption of the alveolar bone. This resorption, as a rule, takes away from the alveolar wall more bone than is required to relieve the pressure. Gottlieb says: "The resorption exceeds the limits." After two days the force of a ligature is exhausted. Now repairing bone deposition takes place instead of the resorption. In Fig. 10 *D* the situation is shown diagrammatically at the moment the baboon was killed. The unresorbed walls of the marrow cells are showing osteoid deposits toward the periodontium. Fig. 10 *E* is a diagrammatic sketch of the upper bone spicule in Fig. 10 *A* (R_1). It shows the vacant Howship's lacunae of resorption (L) at the old alveolar bone (K), covered with newly formed osteoid tissue (O). So Oppenheim did not see the acute effect of the ligature, but only a stage of regeneration after the influence of force which was exhausted. Sandstedt observed the effect of the forces while they were in action.

Oppenheim further states in his publication that by the use of strong forces the biologic reaction of the tissue does not take place on the side of pressure.

This statement contradicts our practical experience in the use of strong forces in our orthodontic treatment according to the old methods. Sandstedt's descriptions of the undermining resorption at compressed periodontal tissues explain why clinical successes are obtained also by the use of strong forces.

The next orthodontically important works are of recent dates, namely, treatises of Gottlieb and Orban,[5] of Johnson, Appleton and Rittershofer,[10] and one by Breitner.[11] All these works, like my own investigations of which I shall speak in the second part of this paper, prove the statements of Sandstedt.

Angle, not being a histologist, cited in his famous work on the treatment of malocclusion, the paper of his pupil, Oppenheim, about the changes of tissues. So he laid down his theory about the transformation of bone as authoritative for our biologic thought about orthodontic treatment. But on account of our present much greater experience in histologic investigations, it seems to be clear that these conceptions are not conclusive on the most important points.

SUMMARY

We must concede the scientific merit of the Swedish investigator, Carl Sandstedt, as being the first who systematically experimented in regard to orthodontic changes of tissues and who has rightly interpreted the histologic results. His highly classical work must be considered as the basis of our present knowledge.

From Oppenheim's experiments resulted complicated pictures which according to the knowledge then current of the biology of the alveolar bone and of the effect of the orthodontic appliances were liable to misinterpretation. The analysis of these pictures is not contradictory to Sandstedt's findings.

PART II. ORIGINAL RESEARCH

The first series of my experiments concerned the biologic effect of recurved finger springs.

Fig. 11 shows the sketch of the appliance which was put on the mandible of a young dog. The first molars and the canines were fitted with bands, and a lingual arch was fixed. On each side a recurved finger spring was soldered, 0.5 mm. in diameter and about 25 mm. long. The spring lay close to three of the four premolars of the mandible. The springs were so bent that the knee was directed on the right side forwards, on the left side backwards. The last right premolar was moved by the free end of the spring. The third premolar of each side was pressed by the middle of the spring, the right second one by the knee, the left second one by the free end of the spring. This experiment lasted five weeks. The springs were adjusted at the beginning of the experiment and after two and a half weeks. This tension effects, according to Nowack,

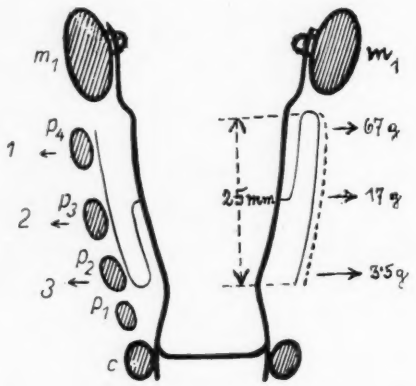


Fig. 11.—Sketch of the appliance for the mandible of a dog. On the first molars (m_1) and the canines (C) is fixed the lingual arch, on which is soldered on both sides, one on each side, a free ending, recurved finger spring. The bend of the spring is directed at the left distally, at the right medially. P_1 to P_4, premolars. P_2 to P_4 are moved by the spring. Free end of the spring is 25 mm. At a tension of one millimeter the free end presses with a force of 3.5 grams, the center 17 grams, and the bend with a force of 67 grams (unequal forces).

a force of 3 to 5 grams on the free end, of 17 grams in the middle, and of 67 grams on the knee of the spring.

This experiment shows the following histologic result: The right fourth mandibular premolar was moved in the direction of the arrow by the free end of the finger spring (Fig. 12 *A*).

We see that the tooth was moved considerably in spite of this minimum of force. The crown was moved during the experiment about 1 mm. from its place. The zone of the alveolus, where the tilt axis lay, remained unchanged. The periodontal space on the side of the pressure is about half as broad as on the side of pull. That is a proof of the fact that the force of the spring was still acting when the animal was killed.

Fig. 12 *B*, marginal side of pull. Z, tooth; P, periodontium richly supplied with cells; T, newly formed bone trabeculae, in the direction of pull. At R is the line of demarcation between the newly formed alveolar bone and the old compact alveolar bone, which remained unchanged. The deposition of newly formed bone is quite considerable, the new bone has already formed, here and

there, new marrow spaces (at M). At the periodontal surface of the newly formed bone one sees osteoblasts arranged in rows. Thus, the formation of new bone is in full progress.

Fig. 13 *A*, marginal side of pressure. Z, tooth; P, the compressed periodontium, nevertheless it is richly supplied with cells, the vitality of which is not

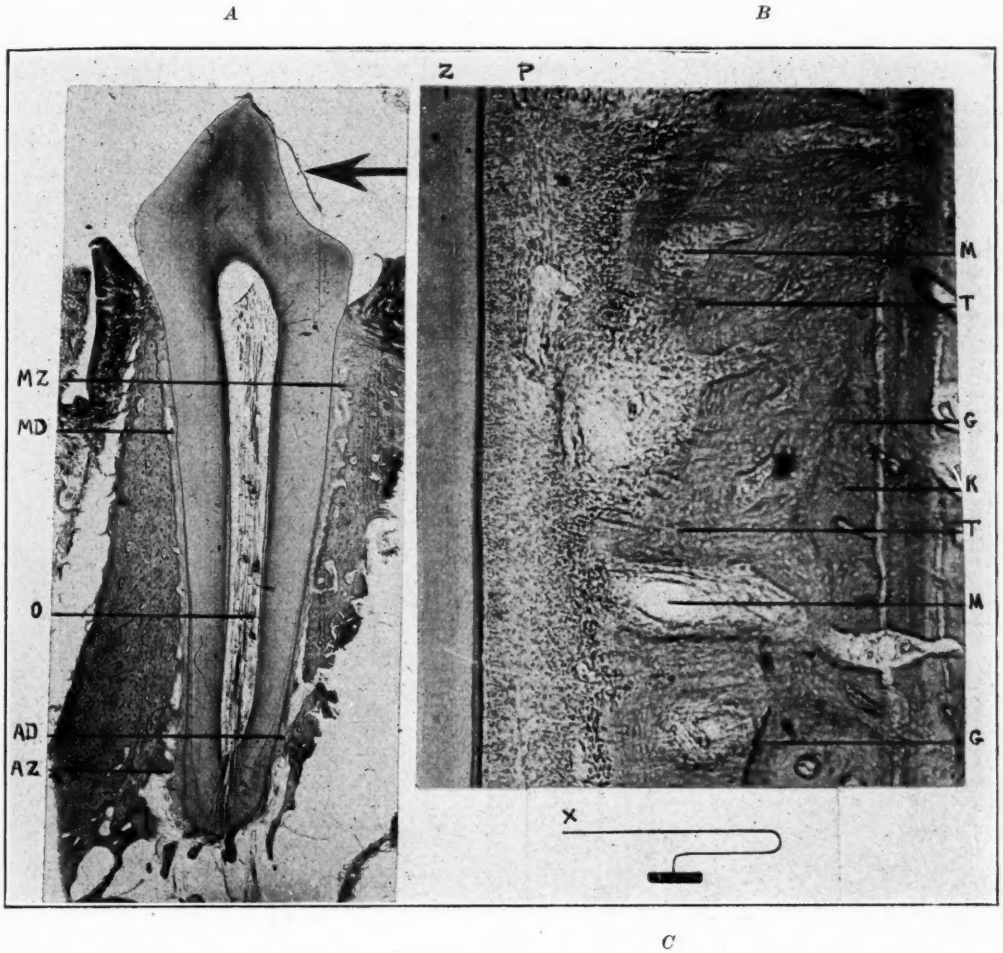


Fig. 12.—Premolar of a young dog, pressed in the direction of the arrow by the free end of a curved finger spring, 0.5 mm. in diameter. The experiments lasted five weeks; two adjustments were made; the force used was about 3 to 5 grams. Each premolar of a dog has two roots. One root lies medially, the other one distally. The pictures shown here are axial cuts through the medial root. The same results were found in the distal roots.

A. General picture: MZ, marginal side of pull; MD, marginal side of pressure; O, tilt axis; AZ, apical side of pull; AD, apical side of pressure.

B. Marginal side of pull, greatly enlarged: Z, tooth; P, periodontium; T, newly formed bone trabeculae; M, newly formed marrow spaces; G, limit between the old and the new alveolar bone; K, old alveolar bone with haversian systems.

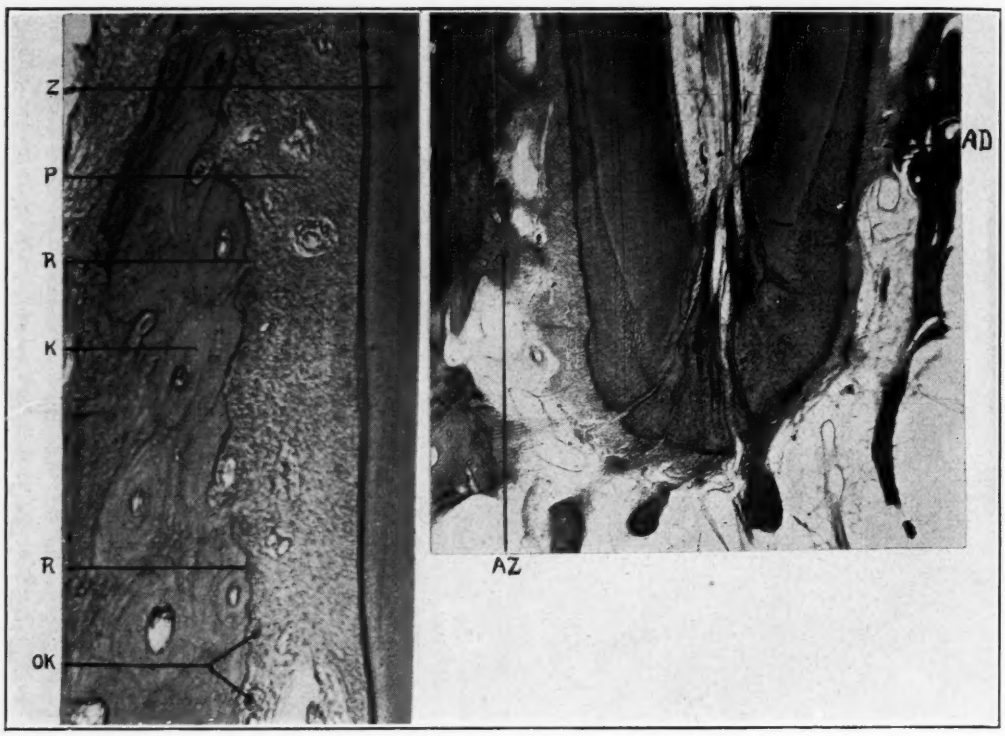
C. Sketch of the spring. The point of application on the tooth is shown at X.

affected and it remained viable. K, the old compact alveolar bone, showing along the resorption line some lacunae, which are occupied by giant cells. Along this line the resorption is very active, but regular. The structure of the old alveolar bone with the densely set haversian systems is also unchanged.

Fig. 13 *B*, zone of the apex. To the left, one distinguishes clearly the strained periodontal fibers of the apical side of pull, and to the right the compressed periodontium of the side of pressure. The side of pressure and of pull

on the apex is diametrically opposed to the side of pressure and of pull on the alveolar margin. On the apical side of pull are also to be seen newly formed bone trabeculae along the strained periodontal fibers; on the side of pressure only a few places are to be found on the scanty bone trabeculae of the spongiosa, which can be interpreted as a resorption.

There is active equal deposition of new bone on the marginal side of pull, and also active and equal resorption on the marginal side of pressure. Both processes can be followed very much below the middle of the root. There is little deposition in diametrical direction. Because of the difference in the activity of the deposition and resorption marginally on the one hand, apically on the



A *B*

Fig. 13.—*A*. Marginal side of pressure of the tooth shown in Fig. 12. Z, tooth; P, periodontium; R, line of resorption; K, old alveolar bone with haversian systems; OK, osteoclasts.

B. Apical side of the tooth shown in Fig. 12 *A*, greatly enlarged: AZ, apical side of pull with newly formed bone; AD, apical side of pressure with little signs of resorption.

other hand, the tooth moves under the continuous influence of this very gentle force around an axis which lies in the apical third of the root.

This perfectly analogous occurrence thus shows teeth which have been moved by the middle of the spring, with a force of 15 to 20 grams in the beginning. None of these teeth showed either resorption of the surface or necrotic regions in the periodontium. It is the aim of all orthodontic treatment to produce this particularly fortunate biologic reaction. In my paper, read before the European Orthodontic Society, 1929,[6] I have named this reaction "the second degree of biologic effect."

Right mandibular second premolar (Fig. 14). This tooth was moved by the knee of the spring. So it was twice pressed during five weeks by a force of about 67 grams, namely, at each tension. The pressure diminished each time during two and a half weeks, by degrees to zero.

The periodontium is, no doubt, for the greater part nucleiferous, but no

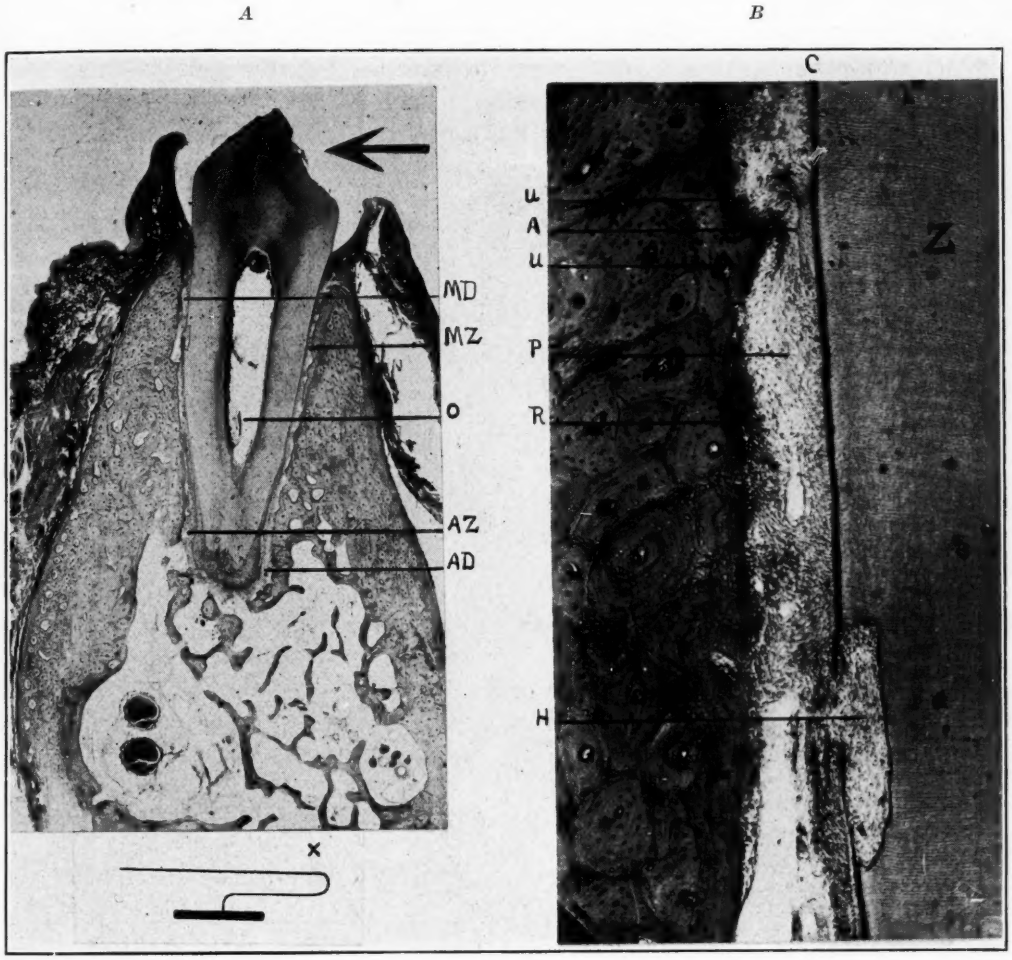


Fig. 14.—Premolar of a young dog, pressed in the direction of the arrow by the knee of a recurved finger string. The experiments were carried on over a period of five weeks; two adjustments were made; the force used was about 60 to 70 grams.

A. General picture: MZ, marginal side of pull; MD, marginal side of pressure; O, tilt axis; AZ, apical side of pull; AD, apical side of pressure.

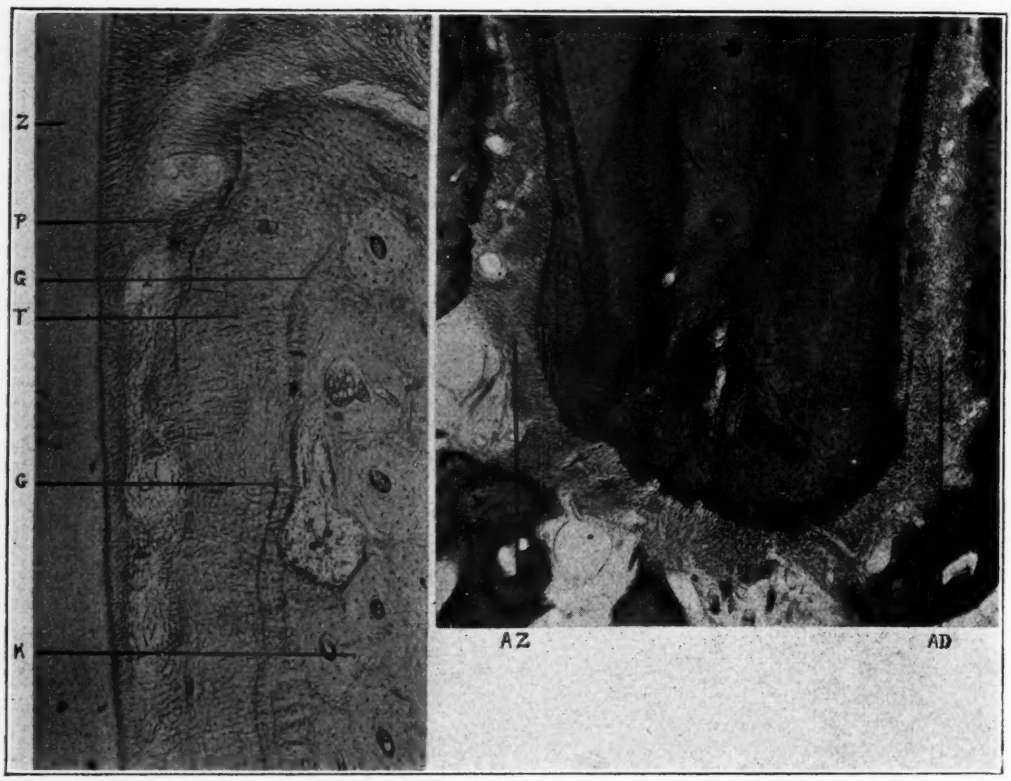
B. Marginal side of pressure, greatly enlarged: Z, tooth (dentine); C, cementum; H, resorption cavity reaching far into the dentine; P, periodontium; R, line of resorption on the alveolar wall, densely covered by osteoblasts; early stages of regeneration; A, compressed area of the periodontium, no nuclei of cells; U, signs of undermining resorption.

C. Sketch of the spring. The point of application on the tooth is shown at X.

osteoclasts are to be seen along the alveolar wall. On the contrary, the surface of the bone is covered by a dense row of osteoblasts. The resorption has been already changed into apposition. At A of Fig. 14 *B* the periodontium, here not being nucleated, is changed into a structureless mass. This we have to regard as a sign of a compression. But, whereas in Fig. 8 the soft tissue at Q was crushed mechanically between tooth and bone by the action of a strong force, there the

periodontium is not compressed. It is only so compressed that the blood cannot circulate in the regions of pressure. In consequence of the bloodlessness the compressed soft tissue is destroyed. It is suffocated. At H we see a resorption cavity on the tooth, reaching far into the dentine.

In Fig. 15 *A* is shown the marginal side of pull. A comparison with the first tooth shows at once that here much less new bone is deposited. The deposited bone is well set off against the periodontium. In this case there is no longer apposition of bone. At G we see the limit between the newly formed bone and the old alveolar bone, which remained unchanged.



A *B*

Fig. 15.—*A*. Marginal side of pull of the tooth shown in Fig. 14. Z, tooth; P, periodontium; T, newly formed bone; K, old alveolar bone with haversian systems; G, limit between the old and the new bone.
B. Apex of the tooth shown in Fig. 14. AZ, apical side of pull; AD, apical side of pressure.

In Fig. 15 *B* the region of the apex is shown. The apical side of pull is like the marginal one. On the apical side of pressure the limit between the periodontium and the alveolar wall has become indistinct.

The force that has acted on this tooth effected probably immediately after each tension such a compression of the periodontium on the marginal side of pressure that the soft tissue was here and there deprived of its vitality by suffocation. Therefore, resorption could not take place; by this means the tooth was fixed in its position till the obstacle was removed (Gottlieb and Orban). The obstacle was removed by most active resorption on the part of the surrounding

tissue which remained viable (Sandstedt). The surface of the tooth itself was also affected by this active resorption (third biologic degree of effect). Two and a half weeks after putting on the spring, the tooth showed a stage of inaction. The force of the spring had certainly been exhausted for some days.

A comparison of the biologic results in both the teeth studied shows great differences. The free end of the finger spring works as we desire according to our present therapeutic ideal. The force is gentle and continuous, so that its effect is not exhausted two and a half weeks after the tension. The biologic reaction of the periodontium, effected by the spring, does not endanger the surface of the tooth because the force is less than the pressure in the blood capillaries. Therefore, the circulation of the blood remains all right and the vitality of the tissue is not injured. Nevertheless, the force is effective enough to suit the requirements of the treatment (about 1 mm. movement monthly).

The teeth moved by the knee of the spring show quite a different result. With the application of 1 mm. the force is so strong that it endangers the vitality

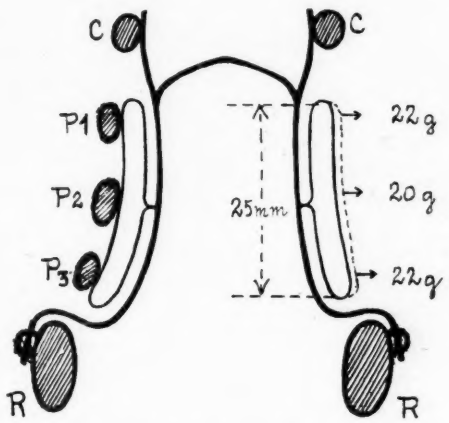


Fig. 16.—Sketch of the appliance for the maxilla of a dog. A lingual arch is fixed on the teeth, R, and on the canines, C. A loop spring is soldered at right and at left for moving the three premolars P_1, P_2, and P_3. The length of the spring is 25 mm. At a tension of one millimeter the spring effects a pressure of 22 grams at the bends, at the center a pressure of 20 grams (equal forces).

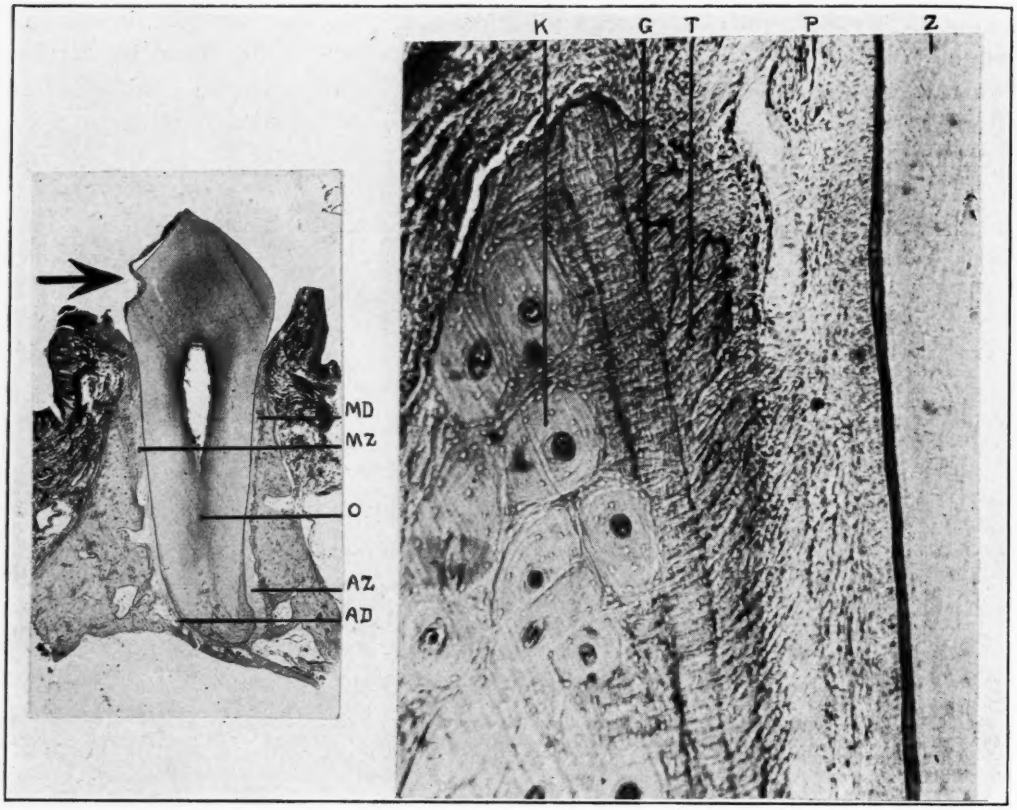
of the periodontium. By this means one does not find here regular resorption of the alveolus on the side of pressure, but interrupted movements. Moreover, the rapid resorptions affect the surface of the tooth. The force at the knee of the spring is exhausted relatively quickly. Two and a half weeks after the tension of the spring, repairing apposition of bone on the sides of pressure had already begun. With a further adjustment of the spring this new bone tissue which can only be resorbed with difficulty must be resorbed again. Also there is the additional risk that the surface of the tooth may be resorbed (Gottlieb).

THE BIOLOGIC EFFECT OF A LOOP SPRING

A lingual arch had been fixed on the first molars and on the canines of a young dog and carried on each side a loop spring of 25 mm. in length and 0.35 mm. in diameter, to move three premolars laterally. The appliance for this experiment was fixed on the maxilla and is shown in Fig. 16. The tooth described below is the maxillary second right premolar. This was influenced during two

and a half weeks by the loop spring with a tension of 1 mm. It must be said that with the other teeth moved by that spring the same phenomena resulted. The force brought to bear upon these teeth is 20 to 25 grams.

The periodontal space on the side of pressure both marginally and apically is half as broad as that on the side of pull (Fig. 17). This indicates that the force was not yet exhausted when the animal was killed. This finding is identical with the finding of Fig. 12 *B* (side of pull of the tooth, moved by the free end



A *B*

Fig. 17.—Premolar of a young dog, pressed in the direction of the arrow by a loop spring 0.35 mm. in diameter. The experiment was carried on during a period of two and a half weeks; the force used was about 20 grams.

A. General picture: MZ, marginal side of pull; MD, marginal side of pressure; O, tilt axis; AZ, apical side of pull; AD, apical side of pressure.

B. Marginal side of pull, greatly enlarged: Z, tooth; P, periodontium; T, newly formed bone trabeculae; K, old alveolar bone with haversian systems; G, line of demarcation between the old and the new bone.

of the recurved finger spring), but the apposition of bone is smaller, because the experiment lasted just half as long as the other one (two and a half weeks instead of five weeks).

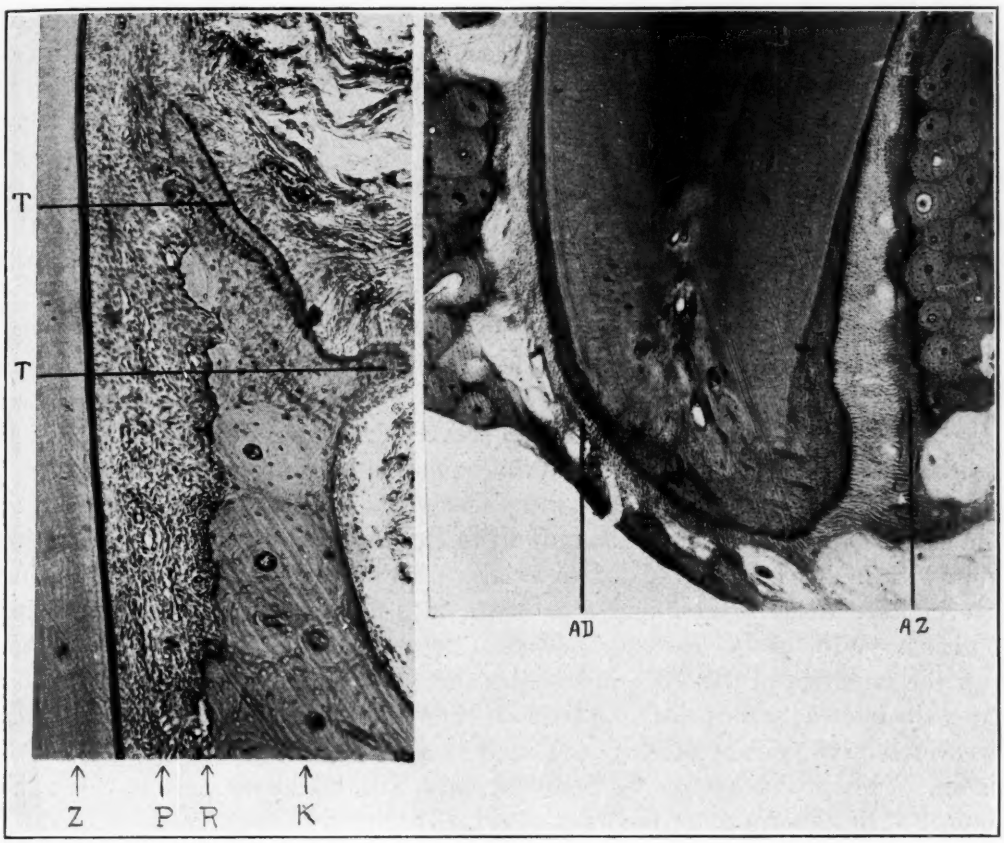
The marginal side of pressure (Fig. 18 *A*) is almost identical with that shown in Fig. 3 *A* (side of pressure of the tooth, moved by the free end of the recurved finger spring).

The apex (Fig. 18 *B*) is moved only slightly from its place according to the tilt axis of the tooth, lying relatively near the apex. On the side of pull (AZ) to the right in the picture we can see the strained periodontal fibers and a small

XUM

line of newly formed bone on the alveolar wall. On the side of pressure (AD) to the left in the picture we cannot distinguish clear signs of resorption anywhere.

The teeth moved by a loop spring 0.35 mm. in diameter show biologic reactions identical with those of teeth moved by the free end or by the middle of a recurved finger spring 0.5 mm. in diameter. All these teeth show in the histologic picture the advantageous biologic reaction, to which we are now aspiring in the orthodontic movement of teeth.



A *B*

Fig. 18.—*A*. Marginal side of pressure of the tooth shown in Fig. 17. Z, tooth; P, periodontium; R, line of resorption; K, old alveolar bone; T, newly formed bone on the outer periosteal surface of the alveolar bone.
B. Apex of the tooth shown in Fig. 17. AZ, apical side of pull with newly formed bones; AD, apical side of pressure.

The histologic findings in question prove first that Kingsley's theory of the flexibility of compressed bones is incorrect, because a force of 3 to 5 grams is much too small to bend the bone. The histologic picture shows clearly that the movement is provoked only by specifically localized processes of resorption and deposition of the old alveolar bone.

This again proves that Sandstedt's findings are correct without exception from the standpoint of modern orthodontia. The findings prove also the suitability of Mershon's method in the use of gentle continuous forces, namely, the various auxiliary springs.

But the findings at the same time militate against Mershon's theory, namely, that only the latent impulses of growth in the jaw are stimulated by these gentle spring forces. The experiments were made on normal jaws of dogs; nevertheless the teeth could be moved away from their normal position at the end of a few weeks. Even the most gentle spring force causes an injury to the jaw, which provokes a definite biologic resistance.

Experimenting with gentle forces this biologic reaction is advantageous (second degree of biologic effect), but with the use of stronger forces the biologic reaction is more liable to injure the surface of the tooth (third degree of biologic effect: regions of bloodlessness, resorption of teeth, or even the fourth degree of biologic effect: mechanically compressed regions with undermining resorption). But even in the case of strong forces the influence of a force in orthodontia is always followed by a biologic reaction.

Even by the use of gentle forces we cannot reproduce the natural growth of the organism. We can only remove obstacles by our regulations during the time of growth and so promote the normal growth indirectly. If we succeed in doing this, we need not fear any relapse, not because we have used gentle forces, but because we have, so to speak, anticipated the normal course of development. With the permanent set of teeth we shall almost invariably get a relapse, even with the use of gentle forces, when we do not use a retainer. If Mershon says that he does not need retention appliances, he is deceived. For according to him there is an interval of two to three months between one adjustment and the next. But the force of a free end finger spring at the knee is exhausted at the end of two and a half weeks and at the free end certainly after four weeks, even with highly elastic kinds of materials. In the following months the spring lies in its position of rest and thus constitutes a retention appliance for this position. With every new adjustment of the spring this process is repeated. But the retention of the tooth in an intervening position is unsuitable primarily from the biologic standpoint; for the new bone depositions by which the alveolus is covered on the side of pressure during the period of retention must be resorbed again. This new bone can be resorbed only with difficulty and involves the danger of the resorption of the tooth (Gottlieb).

The experiments prove further that the free end auxiliary springs in the commonly used typical form, which I used also in my experiments, do not represent the most suitable appliance for orthodontic movements; even the forces stimulated at the bend of a spring constitute a danger to the therapy.

CONCLUSIONS: THE FOUR DEGREES OF BIOLOGIC EFFECT CAUSED BY ORTHODONTIC FORCES

The experimental investigations with orthodontic spring forces of determined intensity have shown that biologically the most favorable treatment is that which works with *forces not greater than the pressure in the blood capillaries.* This pressure in men as well as in most mammalia is 15 to 20 mm. Hg; it is about 20 to 26 grams for 1 sq. cm. surface. With this knowledge we are able to make the following division of the biologic effects produced by orthodontic forces:

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First Degree of Biologic Effect.—The force is of such a short duration or so slight that no reaction whatever is caused in the periodontium.

Second Degree of Biologic Effect.—(Example shown in Figs. 13 *A* and 18 *A*.) The force is gentle, speaking biologically; it remains below the pressure in the blood capillaries, i. e. less than 20 to 26 grams for 1 sq. cm. surface, but it nevertheless is so intensive that a continuous more or less lively resorption takes place in the alveolar bone at the regions of pressure.

Biologic effect after the force ceases: Anatomic and functional *restitutio ad integrum* of periodontium and alveolar bone. No resorption of the root.

Third Degree of Biologic Effect.—(Example shown in Fig. 14 *B*.) The force is fairly strong; it just represses the pressure in the blood capillaries of the regions of pressure. At these areas bloodlessness of the tissues takes place, and also suffocation of the strangled periodontium. In consequence of this, resorption of the necrotic tissue parts occurs beginning around the areas of pressure. This resorption takes an impetuous course and attacks also those parts of the surface of the root the vitality of which may be injured by the pressure.

Biologic effect after the force ceases: Functional *restitutio ad integrum* of the periodontium, alveolar bone and the resorbed surface of the root, but perhaps also progressing resorption of the dentine.

Fourth Degree of Biologic Effect.—(Example shown in Figs. 7 *B*, and 8 *A* and *B*.) The force is strong; it squeezes the strangled periodontium on the side of pressure. At the strongest degree the tooth touches the bone after the soft tissues are crushed. Resorption occurs around the regions of pressure, and also undermining resorption from the marrow spaces. There is danger that the injured tooth surfaces may be resorbed.

Biologic effect after the force ceases: The same as that of the third degree, but besides the danger of pulp death as a consequence of tear in the tissues, there is crushing or bleeding on the apex and possibility of ankylosis of the tooth with the alveolar bone.

This diagrammatic division teaches us that in practice continuous forces of not more than 15 to 20 grams for 1 sq. cm. surface shall be used to keep safely within the limits of the biologic optimum.

It is known that the teeth of our patients are reacting very differently to the same orthodontic force. The cause of these individual differences is the constitutionally different speed of bone resorption.

The present biologic division demands of modern orthodontic appliances that the forces used must be objectively measurable. In Angle's appliances with screws and ligatures this is not usually the case; the contrary is true in Mershon-Lourie's appliances. So, to the numerous advantages of the latter appliances the objective measurability of the spring forces is added. The forces of elastics are also measurable. Forces resulting from swelling of silk, wood or rubber wedges are not measurable and are mostly too strong from the biologic point of view.

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DISCUSSION

Mr. G. Northcroft, London.—Why is the point of rotation in Dr. Schwarz's paper considered to be around the middle of the tooth, whereas Oppenheim believed that the point of rotation was around the apex of the tooth? Can Dr. Schwarz explain this difference of opinion.

Dr. Schwarz.—Mr. Northcroft's query regarding the real position of the tilt axis of orthodontically moved teeth is answered by a study of the pictures shown. These demonstrate better than all theories where the axis actually lies. These histologic findings are proved by my own experiments and research in the tilt axis, published several years ago.[7 8 9] It would take too long to discuss all the factors which come into consideration in connection with the position of the tilt axis; but I am sure that it can never lie on the apex itself when the tooth is pressed on one spot by a spring.

XUM

DEPARTMENT OF
ORAL SURGERY, ORAL PATHOLOGY AND SURGICAL ORTHODONTIA

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DIAGNOSIS AND TREATMENT OF LESIONS PREVENTING NORMAL OPENING OF THE MOUTH

Six Illustrative Cases*

By J. B. Brown, M.D., F.A.C.S., and W. G. Hamm, M.D., St. Louis, Mo.

THE opening of the mouth may be limited by a number of different causes. To determine which of these causes is present, careful histories and examination are always necessary. In some cases of bony ankylosis, there may even be some difficulty in determining which side is involved.

The following case reports are of a rather wide variety of lesions that have been seen in this clinic.

Case 1.—*Bony ankylosis of seventeen years' duration.* A girl of nineteen years presented herself with an almost complete ankylosis of the mandible of seventeen years' duration.

She was shot with a shotgun at two years of age, and the cheek, nose, bony orbit and eyelids were blown away. The joint region was evidently opened into and the zygomatic process broken. Healing occurred with severe deformity and with only very slight opening of the jaw, which was dependent on the springiness of the bone itself and possibly on some slight "give" in the region of the ankylosed joint.

The patient had never known the sensation of really masticating food, although she had grown to good strong womanhood in spite of her handicap. She claimed that she had had but one set of teeth in her life. This was taken as a mistaken idea on her part, however, because the teeth that were present were permanent ones, and x-ray pictures showed no unerupted teeth except third molars. The remaining teeth were in fair condition except for irregularities of position and some neglected caries.

*From the Service of Dr. V. P. Blair, Department of Surgery, Washington University School of Medicine, and the Oral Surgical Clinic, Washington University School of Dentistry, St. Louis.

Fig. 1.

Fig. 2.

Fig. 1.—Solid bony ankylosis with zygomatic process broken down and fixed over the area. Seventeen years' duration.

Fig. 2.—Shows release of the ankylosis and removal of displaced zygomatic process in Fig. 1. Practically perfect function was obtained after the seventeen years' fixation, as shown in Fig. 4. Note that there has developed some bony or heavy fibrous connection from the region of the coronoid to the zygoma or into the zygomatic fossa so that there seems to be a definite bearing point here for movements of the jaw.

Examination showed the ankylosis as described. It is important to note that there was a slight movement, as this is probably the saving factor for the opposite joint. This slight active movement of a joint, especially in childhood, is a great preserver of function, and this is true in other joints of the body. Although much of the upper part of the face had been destroyed, there had been no damage to the lining of the mouth, and the diagnosis was classed entirely as a bony ankylosis.

X-ray examination showed solid ankylosis with the zygomatic process broken down over the sigmoid fossa and condylar neck (Fig. 1).

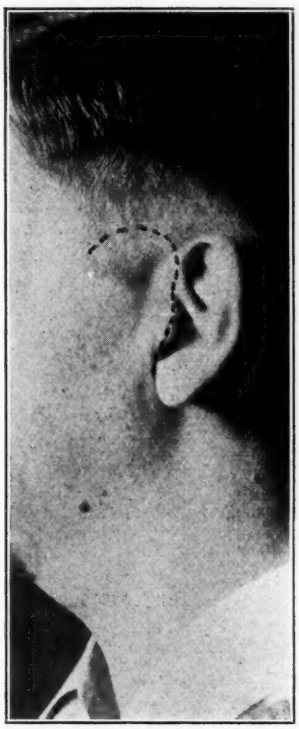

Fig. 3.—Blair incision for access to temporomandibular joint. This incision is the same as originally described[3] except that it is placed further back, so that the scar comes down just at the reflexion of the crus of the helix, over the tragus and on down close to the lobe. This often leaves an almost invisible mark, and the same principle is used in placing any similar incision in this area.

Operation.—Anesthesia was carried out by local infiltration until some bony landmarks could be made out, and then a deep block was done of the second and third divisions of the fifth nerve at their exits from the cranial cavity.[1] The incision was made through the scars and down in front of the ear as described by Blair (Fig. 3). The upper part of the seventh nerve was not functioning, and this gave some added leeway in the exposure. The zygomatic process was then removed, as it was broken down over the area. (This step is only rarely necessary in the average case.) It was then found that cortical bone extended across from the mandible to the temporal bone without any visible mark of a joint cavity. The entire bony area was removed, and the excision carried clear across to include the coronoid process.

It was then possible to open the jaw about 2 cm. with only slight discomfort in the opposite muscles, and it was plain that these opposite joint surfaces would suffice if the soft tissues would give. The jaw was blocked open with a wood block wired to the maxillary and mandibular teeth and covered with dental compound.

After Care.—The block was removed in two and one-half weeks, and the patient encouraged to chew and to force the opening to the limit for several hours each day by keeping rubber stoppers between the teeth.

Result.—There has been a normal opening and function. The patient has experienced the first normal meals of her life. Over two years there has been a steady improvement so that movements are normal and there is no sign of trouble (Fig. 4).

Fig. 4.—Patient whose x-ray pictures are shown in Figs. 1 and 2. Has practically normal function after seventeen years of closure.

Later x-ray pictures show the surprising condition of a bony or dense fibrous overgrowth in the region of the coronoid that is believed to form a false articulation with the zygoma or in the zygomatic fossa and actually to give some bearing to jaw movements on this side (Fig. 2).

Comment.—This first patient is shown not so much for diagnosis as for the following important points:

(1) Especially in childhood complete ankylosis of the jaw is a definite menace to life. With any severe throat infection the patient would be in extreme danger. Besides this there are the added bad conditions of improper nutrition, speech and schooling, neglected dental caries and mouth hygiene in general. Therefore, it may be taken that the relief of bony ankylosis is a necessary procedure, and its operative correction should be carried out as soon as its permanence is established, without the prolonged use of dilators that are useless in this condition.

(2) This patient has gone through the most dangerous period of life with ankylosis, and over the longest period of years of which we have known.

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(3) She has gained normal function by the complete resection of the ankylosed side, and by having preserved the opposite joint surface throughout seventeen years of relative inactivity.

(4) The use of deep block anesthesia has been of distinct advantage in lessening the possibility of tracheotomy and of postoperative pneumonia.[1]

(5) The apparent false joint formation of the coronoid with the zygomatic region has not been observed by us before or found recorded anywhere.

(6) The patient has gone on with further reconstructive work including replacing the entire covering of the upper part of the face and the entire nose.

CASE 2.—*Bony ankylosis on one side following fracture of both condyles.* A girl of five years had received fractures of both condyles one year previously, and the original treatment (elsewhere) had been fixation of the jaw in occlusion. We believe that this is the correct treatment for this type of fracture and have seen but very few cases of ankylosis occur following it. The cases that do occur may have badly torn capsules or cartilages, or there may be even some sequestration or absorption of the condyle. These points cannot be determined originally, and we believe it is bad practice to try to control directly these fragments, or to excise them early.

The most frequent cause of bony ankylosis is an arthritis accompanying some infectious disease, or a prolonged middle ear or mastoid infection.

Diagnosis.—The decision in this patient was to determine which side was involved. This was not difficult, but, up to the time of the child's entry into the operating room, the mother believed that it was the opposite side. We have had one child with an ankylosis of six years' duration in which the parents had not the slightest remembrance as to which side had originally been involved. With such hazardous information from the parents, it is imperative to determine by examination which side is to be operated on, and the points made by Blair[2, 3] should always be borne in mind. (1) There is usually some visible and palpable prominence of the ankylosed side. (2) If any movement is present, it can usually be felt around the sound joint and not around the ankylosed joint. (3) On forced opening there is a deviation toward the ankylosed side. This is just the opposite in a forward dislocation. (4) The preangular notch on the lower border of the mandible is usually deeper on the ankylosed side. (5) X-ray examination usually shows excess bone and complete loss of the joint outlines. In this patient there was a large overgrowth of bone.

If both sides are ankylosed, the above signs are most marked on the worst side, and this determination is important too, for this is the side first operated upon.

Operation.—The joint area was exposed through a Blair[3] incision (Fig. 3). The masseter was taken off the zygomatic process and the bone excised from the entire region. It was found to extend medially 22 mm., and when it was thought sufficient bone had been taken away, the thumb could be gotten between the ramus and the temporal bone. The jaw was blocked open.

Result.—The block was removed the fifth day and the child discharged the seventh day. Active chewing was advised and so well carried out that no further trouble or ankylosis has occurred.

Comment.—One of the main points is the diagnosis and determination of the side involved as listed in an earlier paragraph.

Another important consideration is the aim of the operative procedure itself. The most important single factor is to excise enough bone. As shown here the thumb could be gotten into the space. It may frequently be necessary to go clear across the sigmoid fossa and remove the coronoid process, and we have gone much farther down on the ramus. We do not believe it is necessary (but rarely) to excise the zygomatic process, for access to the joint.

Although we do try to put a flap of fascia deep down in the cavity, the fascia available locally is hardly ever large enough to cover the bony surfaces entirely, and the operation perhaps had better be considered as a bone resection rather than an arthroplasty.[4]

Fig. 5.—Patient with mouth blocked open following operation for fibrous ankylosis due to heavy soft tissue scarring and fibrous fixation around the coronoid. Wires are put around the neck of one tooth above, and below, a wood block of suitable size is put between the teeth and held by passing the wires around it. Over the whole thing a coating of dental compound is placed. The scar on the cheek is a point of apparent perforation at the time of the original noma six years before.

The point of blocking the mouth open is open for question, but we do it in nearly all cases. It gives a stretch to the soft tissues that is hard to get any other way during the days of healing, and so far has seemed advantageous. It does shorten the space between the bones somewhat, as the ramus approaches the temporal bone on opening when the condyle is missing.

Recurrence of ankylosis is extremely rare if wide enough resection of bone has been done.

Case 3.—*Soft tissue ankylosis of six years' duration.* A girl of eleven years had supposedly had typhoid fever at five years with some type of sloughing wound over the entire left cheek that left the jaw solidly closed. Three years later an incision was made (elsewhere) in the cheek and the jaw opened for a few days; after this it gradually closed tightly.

Examination showed the jaw closed with no "give" at all. The examining finger could not be gotten between the teeth and cheek. There were marked sordes, inflammation and caries. The child was bright but was only in the third grade at school. Her general nutrition was much below par.

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Diagnosis was, of course, soft tissue ankylosis but joint involvement also had to be considered. X-ray pictures showed fairly normal joints, but gave no definite assurance that the coronoid might not be firmly fibrosed in the zygomatic fossa.

Operation.—An incision was made into the cheek inside the mouth. Some scar was dissected away and a raw area was left that extended from the depth of one buccal fornix to the other. A Blair jaw dilator was then used and the jaw stretched open. The coronoid and the anterior border of the ramus were bared, and the remaining tightness was found to be around the coronoid. This was removed and the jaw opened normally, so that the joint surface was taken to be in satisfactory condition.

The mouth was blocked open (Fig. 5), and a free skin graft was put over the raw area and held with a dental compound mold.[5]

Postoperative Course.—The patient gained twelve pounds in four weeks with the block in place. Not much of the original graft persisted, and another was put in after five weeks. Following this the opening was normal and mastication satisfactory. There was a partial anterior dislocation presumably from the pull of the external pterygoid muscle, and it might be considered advisable to disconnect this muscle from the jaw if the temporal attachment is removed.

Comment.—(1) In spite of the supposed seriousness of the condition this is another patient who has gone through a dangerous period of life with her mouth tightly closed. (2) The futility of simply cutting across a scar band and hoping for its release is shown. Scar bands any place in the body that are so treated always recur with more contracture than ever if the lost surface tissue is not replaced. (3) The diagnosis of soft tissue ankylosis was easily made, but the possibility of joint involvement was not ruled out until the jaw was freed at operation. (4) This type of soft tissue fixation may be much more refractile to treatment than bony ankylosis.

CASE 4.—*Limitation of motion due to lateral deviation of an erupting maxillary third molar.* A woman of twenty-four years complained of increasing difficulty in opening the mouth without pain, but with some discomfort over the anterior border of the left ramus. The duration had been two months, but, when first seen, opening was only about half normal. There was no history of infection or injury.

Examination.—No sign of infection, chronic subluxation, malocclusion or paralysis. The patient was quite fat and had pouchy cheeks. High up in the left buccal fornix could be made out the crown of an erupting third molar. On opening the jaw the soft tissues over the coronoid were seen to come very close to the tooth. The coronoid could be made out on the dental film also.

Treatment.—As the tooth was worthless, it was thought best to get it out before the opening was too limited. This was done under local anesthesia, and, as soon as it was out, the patient was able to open her mouth normally. There has been no further trouble.

Comment.—This simple condition might have caused a good deal of discomfort if the cause had gone on unrecognized, and, if the mouth had become tightly closed, the examination would not have revealed the tooth which, as the causative factor, might have been missed.

CASE 5.—*Tetanus (lockjaw) masked by the supposed occurrence of local infection.* A woman of thirty-two years complained of soreness of the jaw and limitation of motion of twenty-four hours' duration. The patient was highly nervous, and repeated several times in the history that she had a sore tooth and had taken cold the day before by exposure several times in the rain, after being in a hot kitchen. To add to the picture of infection her neck was sore and stiff on the same side as the tooth infection.

Examination.—Perhaps the most usual cause of pain on opening and spasm of the closing muscles of the jaw is an infection about a partly erupted third molar, and in this patient one was prepared to find such an infection. However, on examination she complained only of the maxillary first molar which did not have much cellulitis around it and did not seem to be responsible.

Tetanus was suspected and the patient closely questioned but gave no history at all of any injury from which tetanus might develop. On general physical and neurologic examination there were no signs of tetanus except the stiffness and soreness of the jaw and neck on the one side. There were no spasms of any muscles and no change in reflexes.

Diagnosis.—It was thought that she had a mild respiratory infection with a painful myositis from the exposure of twenty-four hours previous, and she was sent to her family physician. Later in the day she developed fairly typical signs of tetanus. The patient and the family became excited and then gave the information that she had had a uterine curettage by a midwife ten days before.

Treatment.—Antitetanus serum was given to the limit intramuscularly, intravenously and intraspinally, but the patient died the second day. It was not thought that the delay of a few hours in giving the serum had any direct bearing on the outcome.

Comment.—This is an excellent example of the responsibility in diagnosis of apparently simple oral surgical conditions. The patient must be considered as a whole, and any leads followed to an end. Rather insignificant local lesions oftentimes require more work and greater accuracy in their diagnosis than gross lesions such as a firm bony ankylosis.

The mouth and teeth are usually quite easy to examine, and, if sufficient local cause cannot be found to explain symptoms, the patient should be kept under close surveillance.

CASE 6.—*Limitation of opening due to infection starting in the soft tissues around a partly erupted third molar.* A woman of thirty-four years had a rather sudden onset of stiffness of the jaw with only slight local discomfort around the region of the partly erupted third molar.

Examination.—There was a small flap of tissue over the partly erupted third molar that was somewhat reddened. There was no pus present, and not much surrounding cellulitis. There were some soreness, tenderness and pain on any forced opening of the jaw. This did not seen sufficient cause for the limitation of movement, and it was noted that the maxillary third molar was displaced laterally much the same as in Case 4. There did seem to be sufficient room for jaw movement, however.

Diagnosis.—With a very definite stiffness of the jaw and absence of marked local symptoms, tetanus had at least to be considered, but there was no possible

history or other signs of it. The displaced third molar was strongly suspected, but, because of the suddenness of onset and local soreness, the lesion was taken to be a myositis of the closing muscles (masseter and internal pterygoid), secondary to the infection about the third molar.

Treatment.—Rest in general, and rest of the jaw. Soft foods, cleansing care of the mouth, light sedatives for pain, and hot applications to the jaw and neck where the regional glands were somewhat swollen.

Result.—Within a few days the inflammation subsided and the opening became normal. This course of events confirmed the diagnosis of infection.

Comment.—This seems on the surface, a simple occurrence, but, according to the resistance of the patient and the treatment instituted, the results may be far reaching and disastrous.

(1) This infection is an extremely common one, especially in women and girls. Our routine care is as follows:

1. Rest.
2. Soft foods.
3. Cleansing mouth wash (5 per cent potassium chlorate in alkaline antiseptic).
4. Keeping the teeth clean with soft brush and soap.
5. Painting local area three to four times with 1 per cent iodine.
6. External local heat if there is swelling or gland tenderness.
7. Adequate doses of sedatives.
8. Incision of the soft tissue flap if indicated, under gas anesthesia, or without any. *Do not use local infiltration.*
9. When the infection has entirely subsided, determining whether the flap should be entirely removed or the tooth extracted.

(2) *Do not extract the tooth during the stage of infection.* It is probable that a spreading infection in this region treated by extraction of the tooth is responsible for the great majority of severe infections and for deaths that are associated with extractions in general. After taking care of a single patient that has one of the huge infections possible or one patient that dies, it seems a remarkable thing that any one ever escapes the fate if extraction has been done during the acute stage of infection.

(3) The origin of the infection is from debris packed under the tongue of soft tissue that lies over the tooth. The avenue of extension is directly down to the masseter on the outside and the internal pterygoid on the inside of the jaw. This is the most common cause of limitation of the opening of the mouth.

(4) The use of heat externally (either wet or dry) for infections is a routine procedure in this clinic. It may be used in one-half to one-hour periods or continually. There may be some argument in favor of cold applications, but cold is more efficacious for traumatic or operative swelling. However, if heat is objectionable to the patient or causes too much pain, cold applications are used.

OTHER CAUSES OF LIMITATION OF MOUTH OPENING

Severe infections about the area of the muscles, cheek or face may limit the opening because of swelling or pain. This may be from an osteomyelitis, a septic phlegmon of the floor of the mouth (Gensoul, Ludwig) a subtemporal abscess,

actinomycosis or a gangrenous stomatitis. The limitation here is one of many symptoms.

A person with a chronic subluxation (cracking jaw) may almost unconsciously guard against opening the mouth.

Reflex irritation may limit the opening from inflammatory processes in the throat, mouth, cheeks, ear canal, or tongue. Painful, unlocalized caries of a tooth may be the fault, and the actual pain so uncertain that the patient cannot even be sure in which jaw it is located. The limitation may be voluntary from pain or really involuntary from reflex nerve irritation.

If a person with tic douloureux finds that opening the mouth brings on a "flash" of pain, he will only rarely open his mouth and often will go without food.

Tumors, cysts about the jaw, malunion of fractures, and benign hypertrophy of the condyle may limit normal movement.

Closure of the jaws from hysteria may occur, but much care should be taken before this diagnosis is made. Perhaps the most frequent foundation is a simulation of tetanus (lockjaw). We observed one woman who thought she was in the throes of "chronic lockjaw," as some one she knew had had tetanus, but she got her symptoms mixed up and held her mouth open instead of closed.

For limitation of motion following even mild injuries with normal occlusion preserved and no subjective or objective sign of fracture, very careful x-ray pictures should be taken of the entire jaw on both sides. Fractures about the ramus, coronoid or condyle may occur with little or no bony separation, and surrounding hemorrhage or muscle spasm may result.

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XUM

NASAL ABNORMALITIES, FANCIED AND REAL

The Reaction of the Patient: Their Attempted Correction*†‡

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WHEN the milkmaid of poetic fancy informed the impertinent inquirer that her face was her fortune, she unwittingly bespoke one of the fundamental truths of our social contact, a truth that has its greatest emphasis when the face happens to be a misfortune. On every countenance is the imprint of the soul, its aims, and its encounters, so that "he that runs may read." At best, however, the reading is not always easy, and, if the page be torn, burnt, or poorly made, the soul might feel that she were unfairly treated, and even desire a change. Should remunerative employment or a change in social status be desired, this change may become a necessity.

Characteristics. The nose is the most conspicuous feature of the face, and any exaggeration, loss, or deformity renders it not only a target for undesired attention, but is not unlikely to produce deprecatory or disquieting self-consciousness. The extent to which individual noses can vary both in size and shape without transgressing the limits of normality is greater than for any other visible part, yet to be acceptable, each individual nose must bear some harmony toward the features among which it has its setting.

Facial Symmetry. The large aquiline nose that can so fittingly surmount other features of classic mold becomes an absurdity when implanted upon a piquant face, or on a face with a long upper lip or a large lower jaw and chin, though the latter is a fitting offset to the large straight nose. A small nose on a very large face can be equally absurd (see Figs. 22 and 41).

Function. Not only is the nose a dominent factor in determining facial appeal, but it has also still more important vital functions in its relation to respiration and to aeration of the paranasal sinuses; these functions may be compromised by some abnormality in the form, consistency, or patency (see Fig. 67).

Surgical Indications. On account either of appearance, impaired function, disease, or of some fanciful reason, the surgeon may be consulted as to the possibility or advisability of changing, restoring, or treating a nose which is not satisfactory. At first thought, the task of giving such advice might seem simple compared with that of making the change, but this is only relatively true. In rebuilding or in changing a nose, one is dealing with material facts related to anatomy and physiology, and with fundamental rules that have been formulated in regard to the proper ensemble of the facial elements, but,

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A *B* *C* *D*

Fig. 1.—An acceptable partial restoration. *A* and *C* show the ravages of an ulcerative process that became active during the patient's seventh year, and destroyed much of the skin of the face and neck, also much of the full thickness and more of the lining of the nose and upper lip, and also parts of the maxilla, palate, nasal septum, and turbinates. *B* and *D* show what was accomplished by restoring the upper lip and the lining of the nasal fossa, partly from an upper arm flap and partly from flaps made from what remained of the external nasal covering, by forming a new external nose from a flap taken from the forehead, by raising the displaced internal canthi, and by replacing the lost skin of the neck will full thickness skin grafts. The treatment consisted in 18 distinct major or minor surgical operations extending over a period of eighteen months. Besides what is seen on the photographs she has been given nasal breathing, is able to wear a maxillary dental plate, and has been changed from a person apparently as unresponsive as a deaf mute to a chatty human being who reflects what is going on about her.

in passing upon the advisability of the attempt, one must also take cognizance of the patient's mental attitude. If that has become a bit warped, it can in the end defeat the main objective, namely, pleasing the patient, regardless of the fact that the newly made nose might be surgically and artistically as near perfection as the available material and our skill permit.

Motifs and Factors. Therefore, we may consider something of the psychology of patients who seek facial corrections. As a general working rule, the more pronounced the deformity or loss, the more likely is a reasonably good result to be acceptable, Fig 1 (see Fig. 38), but, conversely, it is well to be cautious about embarking upon the correction of slight defects (see Figs. 8 and 9). Adolescents of both sexes, especially those who have no regular employment, are more likely to be overparticular than are the more matured,

Fig. 2

Fig. 3*A*

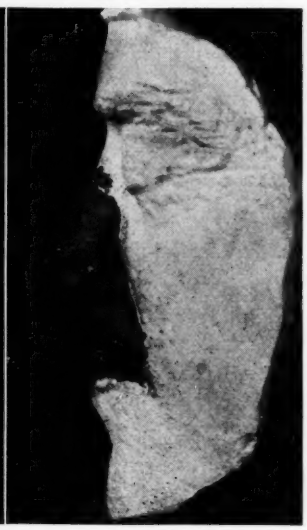


Fig. 3*B*

Fig. 2.—Fancied defects. This patient had allowed himself to become obsessed with the idea that he had a deformed nose, and his reaction to it was such that he was a disrupting influence in his family. For the sake of the latter, we went deeply into the case and concluded that if there was anything artistically wrong, it was his receding chin, and, in hopes of being able to do something for the situation, the latter was built out to a more suitable contour. One thing that lent plausibility to the hope that the chin might be the unrecognized offender was his inability to point out any particular thing that he found wrong with his nose. The photograph shows the unchanged nose and the built-out chin. Whether this constituted an artistic improvement is immaterial as it failed to change his warped psychology.

Fig. 3.—Casts as an aid to diagnosis and to plan. *A*, Plaster cast of a face in which the lower half of the nose, quite a bit of the upper lip, and the adjacent parts of the cheeks had been destroyed. Building up the lost parts of the lip, cheeks, and nose with modeling clay, as shown in *B*, would give a general idea of the type of restoration needed. First, the lip and cheeks are reconstructed to form the foundation upon which to build the new nose, as shown in *A*, and then, upon this, building the nose as shown in *B*. Accurate patterns can be cut of the amount of tissue needed for each of the component steps of the correction which though interdependent are two entirely separate operations. As a preliminary to a contemplated change in the molding of a normal nose, the positive casts may be made in white plaster and also in gelatine and upon these the results of certain operative procedures can be fairly accurately forecast. Plan and check, then operate only when the plan checks right.

and a patient's inability to state accurately and succinctly the particular thing that displeases him should excite grave self-doubt in the surgeon's own ability to satisfy. This same uncertainty should also excite the suspicion that the accused nose might not be the real fault. Not infrequently a short or an oversized chin is the real but unrecognized offender (Fig. 2). It is sometimes difficult to foretell accurately the ultimate reaction, but, where there is

A *B* *C* *D*

Fig. 4.—A poorly planned attempt. *A* and *C* show the condition in which this woman presented herself after she had been worked upon in a city two thousand miles from her home for approximately three years, by some one who evidently started without an adequate plan. The defect had resulted from some sort of ulceration and its treatment. *B* and *D* show the results that were obtained in five operative steps, one of which included the removal of the scarred nose and the results of the abortive attempt at repair. She came twice to our city—once for eighty-nine days and once for fifteen days—with a total of but twenty-three days of actual hospitalization. The economic results of mishandling, such as this unfortunate previously went through, can be very devastating.

5A 5B 6A 6B 7A 7B

Fig. 5.—Normal but displeasing. *A*, A dorsal hump on a nose that was otherwise pleasing to the bearer, and in which there was no other exaggeration that would be rendered more noticeable by the removal of the bony hump. In this case a satisfactory result was obtained by the subcutaneous removal of the hump through an incision made within the nostril. More often there is an extra length of nose, a droop of the tip, or a width of bridge that would become more apparent after the removal of the hump and cause the result to fall short of expectation if not also corrected.

Fig. 6.—Normal but displeasing. *A*, A normal and otherwise satisfactory nose with disproportionately flat bony bridge. The result shown in *B* was obtained by implanting a piece of costal cartilage. The pattern for the cartilage was obtained by building up the bridge with clay on a plaster reproduction of the face. Not all flat bridges can be satisfactorily corrected by this simple plan. In addition it may also be necessary to narrow the bony bridge, advance the tip, or shorten the nose; or there may be a fault that cannot be overcome by rational surgery.

Fig. 7.—Patient's wishes versus rules of symmetry. In many the desire for a certain particular change amounts to an obsession, and for such, it is always safer to follow the patient's expressed desires or refuse to touch the case. We rarely see one that can be talked out of the desire, and usually the impression is too deep to be effaced by a mere artistic improvement. It is often a subconscious reaction to derogatory comment. The patient shown in *A* was operated upon because he appeared to be a perfectly well-balanced individual who definitely and succinctly stated that he wanted his nose shortened because he was "guyed about the tip." He expressed himself as being satisfied with the result, but better facial contour might have come from building out the chin and letting the nose alone.

a real question, the patient should be given the benefit of the doubt; the experienced man is not very liable to make a grave mistake, and, for the younger one, a wrong guess is often productive of much salutary, though gruelling, education.

Diagnosis and Working Plan. The external nose is made up of a covering of skin and subcutaneous tissue, a supporting framework of bone and cartilage, and a lining of skin in the vestibule and mucosa in the nose proper. It should give adequate and not too ample breathing space, and the size and contour should not be grossly inharmonious with the face. If, after an adequate examination and history, the surgeon will consider any pathologic process present, and each of the anatomic components separately, also the facial balance and the patient's mental reaction, and in addition will study and experiment upon plaster of Paris and plastic reproductions of the face, he will usually be able to make a working diagnosis and prognosis, and, where indicated, a plan

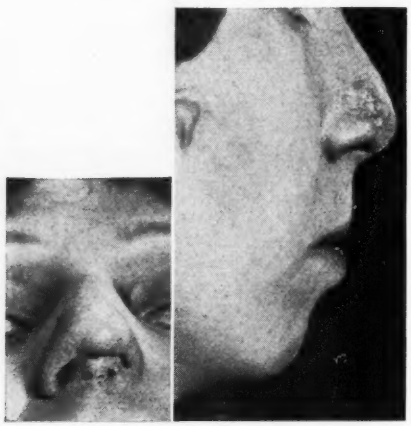


Fig. 8 Fig. 9

Fig. 8.—Ill-advised surgery liable to be disappointing. From the history in this case it is probable that the original fault was entirely in the patient's disposition toward, and not with, the nose itself. She underwent an operation of her own seeking to change the shape of the tip. This was done by a man of skill and proved to be fairly satisfactory, but she undertook to have just a little more work done by another man. After he had performed four more operations, she was in the condition shown. There was complete obstruction of the left nostril and partial obstruction of the right, with the whole of the lower part of the nose a hard mass of scar tissue. The only worthwhile correction here would have been a rather extensive removal of the damaged organ and the making of a new one, as was done in Fig. 4. To this she was unwilling to submit and most likely went to someone who would do some further tinkering. People who are seeking unneeded and inappropriate changes like glowing promises and fall easy victims to the inexperienced or the unscrupulous.

Fig. 9.—Distortion from ill-advised surgery. This patient falls into the same class as the preceding. After an operation to reduce the size of the nostrils, several others had been done to correct the damage resulting from the first. Besides the snubbing of the end and an obstructed air-way, the tip was covered by a noticeable rough scar. It was the latter that caused her to seek further surgery, but she also refused to go through with the procedures necessary to obtain a worthwhile result.

of correction (Fig. 3). The general plan of correction should always be worked out before decision to operate is made (see legend under Fig. 38). This will save time and missteps, will facilitate the work, and improve the result (Fig. 4).

Types Presented. The conditions that are presented for correction may be roughly classified as coming under the headings of:

A. Normal noses with average facial symmetry but with which the patient is not satisfied: As a class, these constitute a plentiful and facile source of

business, or a nuisance, according to the practitioner's viewpoint and ambitions (Figs. 5, 6, and 7). Unless the attention of these patients is definitely concentrated upon some easily changed element, such as a simple hump or depression, it is better for the well intentioned surgeon, and, if he will accept the advice, also better for the patient, that the desired correction not be attempted (Figs. 8 and 9).

B. Noses normal or nearly so, that from atavism or some other cause are sufficiently out of harmony to warrant a rational surgical modification. The nose may be too large (Fig. 10), too long (see Fig. 42), too short (Fig. 11), have a dorsal hump (see Fig. 41), depression (see Fig. 6), or some other nonpleasing character.

With these can be grouped, as far as correction is concerned, all the congenital oddities such as absence of the entire nose (Fig. 12), and of half of the nose (Figs. 13 and 14), bifid nose (Figs. 15, 16, and 17), lack of for-

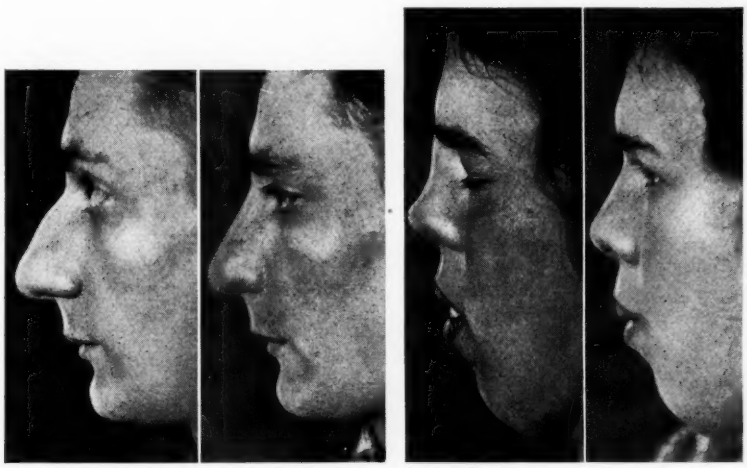


Fig. 10*A* Fig. 10*B* Fig. 11*A* Fig. 11*B*

Fig. 10.—Normal but displeasing. This nose is simply large in every direction, and abnormal consciousness of it was supposed to be interfering with patient's accomplishment and utility. Any plan to change it should take cognizance of the fact that the enlargement was in all dimensions and that all should be reduced. To do this the external covering was dissected free from the bone and cartilage as described under Fig. 28, and, in addition, the posterior ends of the intravestibular incisions were continued out and up in the ala-labial crease externally. The dorsal prominence was removed and the bony bridge narrowed. The tip was made narrow by removing parts from the anterior ends of the lower lateral cartilages and the columella shortened by an excision of cartilage and skin at its anterior end. A triangle of skin was removed from the posterior extremity of each ala, which, together with the removal of a triangular piece of the vestibular lining further forward, permitted of a reduction in the size of the nostrils.

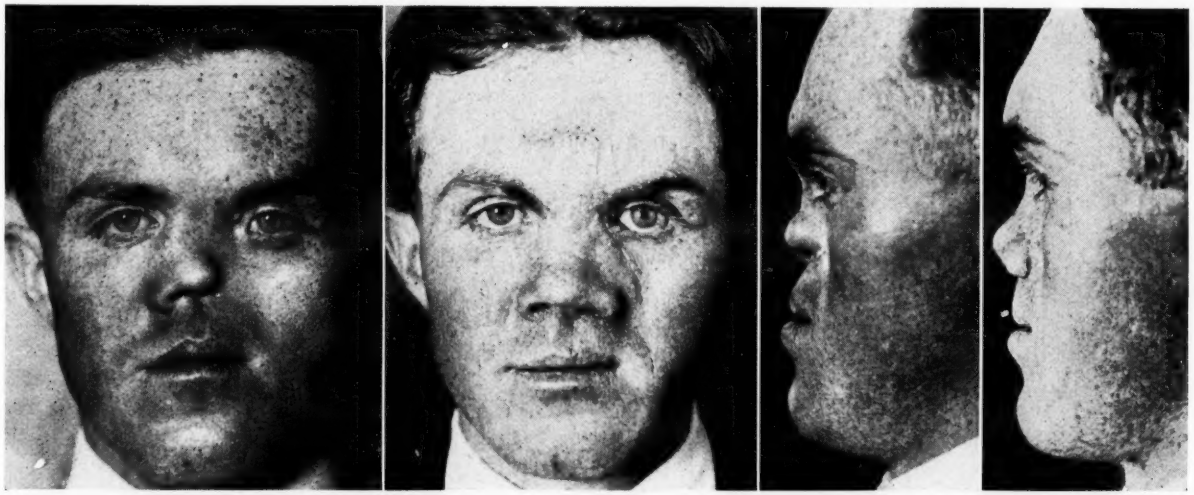
This result was finally satisfactory to him but the postoperative swelling and subsequent thickening of the tissues persisted a very long time. It was thought that this latter might have been exaggerated by an excessive reaction following the use of a rasp to do the bone cutting or to the presence of raspings within the wound. This is the last case upon which we used the rasp to remove a hump.

We have repeatedly observed that the results of attempted reduction of the size of the lower (the cartilaginous) half of the nose were less satisfactory than had been desired, because of the fact that reducing the size of the cartilaginous framework and of the lining did not lessen the size of the external skin covering which in this part is thick and rather inelastic. In the case described, removal of triangles of skin from the posterior ends of the alae at least partially overcame this difficulty. In none of our cases in which it was necessary to remove areas of the skin covering from the tip or ala have the scars been objectionable. And we have determined that in the future any patients demanding a reduction in the size of the tip (especially women), will be accepted with the understanding that a section of skin might also be removed; and that this would leave a detectable, but most likely a practically invisible scar.

Fig. 11.—Too short to be pleasing. This is a profile of one of the bifid group in which there was the increased breadth between the eyes and a sharp groove in the tip, and, as in all of these cases, the nose was also short. Besides various procedures to lessen the breadth, an inverted V-Y operation was done on the dorsum supplemented by an oblique cut through the septum from the dorsum at the lower border of the bony bridge, downward and backward to the base of the columella. This lowered the cartilaginous part of the nose and also the lip as will be seen in Fig. 22, *A* and *B*.

A *B* *C* *D*

Fig. 12.—Nasal oddities—total absence. This boy, nineteen years old, was born without an external nose, nasal passages, or accessory sinuses, but with a well-developed nasopharynx. He had the downward turn to the internal canthi that we have observed to be a rather constant accompaniment of a unilateral congenital nasal absence. The correction consisted first in removing both blind tear sacs and raising the canthi by switching a flap from each upper lid; second, raising a flap to give access to the site of the nasal fossa base at the upper lip. At this same operation, with a finger in the nasopharynx and a site on the base line of the skull as guides, a tunnel was chiseled through hard and finely cancellous bone corresponding to the position of the natural nasal passages, exposing, as we proceeded, the upper surface of the palate covering until the nasopharynx was encountered behind. This new passage into the nasopharynx was filled with a gauze roll covered with a thick split skin graft taken from the thigh. The flap raised from in front of the bone was sutured so as to extend the floor of the new nasal passage forward, thus advancing the upper part of the lip (compare Fig. 12, *C* and *D*). The external nose was made in the usual way from a forehead flap. The forehead was too low and narrow to give a proper sized flap, with the result that the new nose is short and the nostril openings are visible when viewed from in front. The most interesting observation about this case is that, in spite of the fact that he had lived nineteen years without a nasal passage, both his health and his ability to do physical work were enhanced by giving him nasal breathing passages.



A *B* *C* *D*

Fig. 13.—Nasal oddities: half nose. In this patient the left half of the external nose was absent, and the anterior nares was closed by a shell of bone lined with mucosa and covered with skin and soft tissue. Posteriorly, the septum rested against the inferior turbinate bone. Correction consisted in raising one flap from the forehead to make the lining of a new ala and vestibule, and one flap from left cheek, base at the dorsum of the half nose, to be used in making the external surface of a new left half. The left nares was opened with a gouge and the passage enlarged with a chisel, and the resulting raw areas were lined with skin graft. By a series of subsequent steps the left half of the external nose was formed from the cheek flap, and the new vestibule was lined and the cheek defect filled with the forehead flap. The left blind tear sac was removed and the canthus was raised up into place. The unused pedicle of the forehead flap was returned and the defect grafted. The new air-way is but partially efficient, but he is satisfied with the appearance which was the object of his visit. In a similar case we found a quite ample nasal passage behind a thin shell of bone, occluding the anterior nares on one side. Referring to *C* and *D*, it will be seen that the improvement of the profile was not so marked as was the front view, but this operation was done primarily to improve the view that he got in his mirror and thus satisfy him. Had he wished it, the whole nose could have been lengthened but at the expense of more complicated operating (Fig. 11). In this type of surgery, "the customer," who is the patient, may not always be right, but if you undertake the correction, he must be satisfied, otherwise the operation is a failure.

Fig. 14*A*

Fig. 14*B*

Fig. 15

Fig. 14.—Nasal oddities: half nose. Another rarity is the condition of a half nose on one side and tubular fleshy mass on the other attached above in the neighborhood of the internal canthus, open below, lined with a patulous tube of mucosa which might represent either the lining of the missing half of the external nose or the nasal duct. The tears seemed to be drained out through this tube. This condition is probably closely related to the half nose shown in Fig. 13. In the cases of half nose we have examined there has been a tubercle above the internal canthus (see Fig. 13), which corresponds in position to the attachment of the mass here shown, and if this mass had sloughed off, the condition of Fig. 13 would have remained. In the correction of this case an attempt was made to use the mass, having both covering and lining, to reconstruct a patent right half of the nose with the remote hope that this might later continue to grow normally. However, the lining proved to be inadequate and a compromise operation was done pending mature growth when a half nose can be made from the forehead. In the course of the operation the lacrymal sac was removed, but later it was necessary to remove a much larger blind mucous sac from deep in the face that likely represented the nasal cavity of that side.

Fig. 15.—Nasal oddities: bifid nose. Occasionally a child is born with a median cleft in the upper lip which must represent a failure of union of the globular processes of the nasofrontal process. In this patient it appears that the cleft had extended up into the medial nasal process into the rudimentary apex, producing a truly bifid nose. In the attempted correction it was found that the premaxillary process had not descended to its natural level, but, with its developing teeth, was found in the intransal space. This was removed and also a pyramidal mass of tissue with its base outlined by the nasion above the median end of the mucocutaneous line on each side of the cleft below and the two nasal tips laterally, with the apex toward the nasopharynx. Removal of this mass left a large nasal cavity lined throughout with mucous membrane, communicating posteriorly with the nasopharynx, and wide open in front. This was closed by undermining the face tissues until the two halves of the nose and lip could be sutured in the midline. This was a mechanical success, but the operation proved too severe and the baby died some time later.

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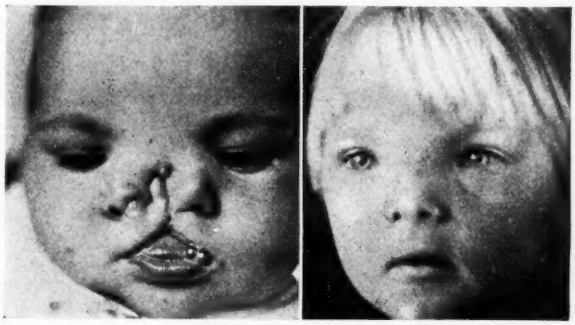
ward progression of the nose (Figs. 18 and 19), and actual retraction of the maxillary foundation (Figs. 20, 21, and 22).

These are to be considered proper subjects for surgery according to the impression they make on the patient, his general condition, and the ease with which the correction can be accomplished, the first essential being that the patient is seriously and deeply desirous to have the correction made.



A *B*

Fig. 16.—Nasal oddities: bifid nose. In this case, the original median lip cleft had been repaired before it came under our observation. There was an almost complete external nose with two nostrils on one side, and a complete half nose with its individual median septum on the other. Correction here followed the plan described under Fig. 15. Fig. 16 *B* shows a photograph sent when the child was three years old. When mature growth is attained, more work will be required to bring the repair up to its greatest possibilities.

A *B*

Fig. 17.—Nasal oddities: bifid nose. A characteristic of this condition is an extensive breadth between the eyes which may be the most marked feature. This was described by Greig (*Edinburgh M. J.* 31: 560, 1924), under the name of ocular hypertelorism, and was thought to be due to some anomalous overgrowth of the sphenoid bone. We have, however, preferred to consider the deformity of the frontal and ethmoid bones as secondary to something that occurs lower down in the frontonasal process (see Figs. 13, 14, 15, 16, and 11, which show some of the different variations upon which this conclusion is based). Usually there is at least a notching of the tip or an absence of half the nose. In this case, there is a defect of one ala only; but there is lack of length of the dorsum that seems constant in all.

C. Acute injuries without loss of tissue but possibly extensive fractures and, maybe lateral or backward displacement, tears, etc. (Fig. 24). In these, if seen early, all tears in the lining should be accurately sutured, impactions pried loose, broken or misplaced cartilages and bones replaced and properly fixed in position, and a free air-way insured. The correction should be made as soon and as thoroughly as possible, and not to do so whenever possible is a serious injustice to the patient (see Figs. 24, 25, and 26).

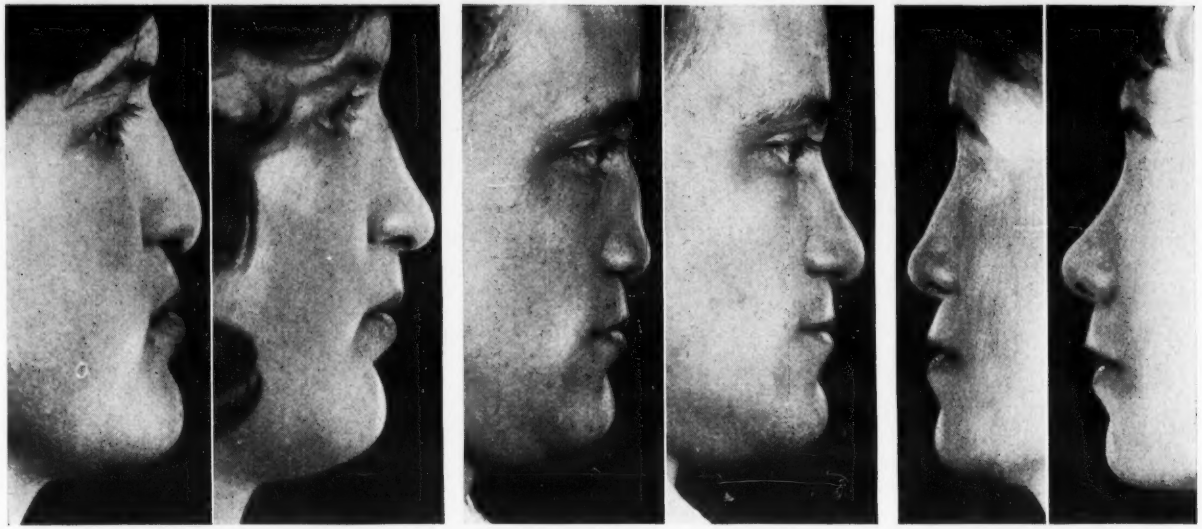


Fig. 18*A* Fig. 18*B* Fig. 19*A* Fig. 19*B* Fig. 20*A* Fig. 20*B*

Fig. 18.—Congenital oddities: retracted tip. In this case the medial wings and the tips of both lower lateral cartilages are displaced backward. Correction consisted in freeing the columella from the quadrilateral cartilage above, and also the lips and cheeks from the maxilla by an incision continuing upward from the buccal fornix. Also the skin covering the lower half of the nose was dissected from the tip and lateral processes of the lower lateral cartilages. This allowed the columella and lips to be advanced and sutured in this forward position.

In other cases the posterior ends of the medial wings lie buried within the substance of the lip giving a short broad columella, and, if this is very marked, it is necessary actually to lengthen the columella to make a satisfactory correction. One plan of doing this is by including a trefoil flap from the surface of the lip with the liberated columella, or by using material from some other source (see Fig. 63). Sometimes the result can be still further improved by putting a cartilage cantilever in the dorsum.

Fig. 19.—Congenital oddities: retracted tip. In this case the columella was actually short. In the correction nothing was done to lengthen the columella itself, but it and the lip were advanced as far as practicable, and the tip was made still more prominent by the use of a cantilever cartilage insert. To give greater lumen to the nostrils the central part of the lip that protrudes forward to supplement the columella was made narrower from side to side by excising a wedge from the thickness of the lip, base toward the anterior nasal spine and edge subcutaneous at the base of the columella. This was all done at one operation.

Fig. 20.—Nasal oddities: retraction of nasal foundation. Lack of forward progression of the parts of the superior maxillary bones that border the anterior nares will cause a retraction of the nose and a somewhat "dished" face. If the lining of the nose is not too short, a satisfactory correction can be made by simply advancing the cheeks, lip, and columella on the underlying bone and cartilage, and later supplementing by a cartilage insert in the dorsum.

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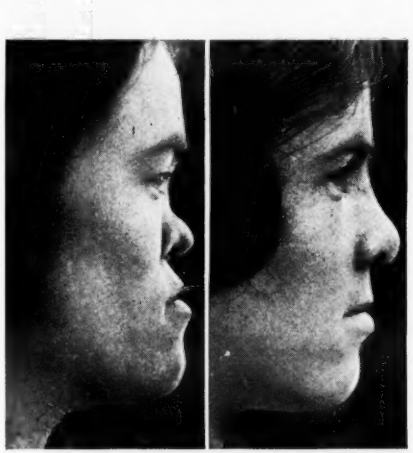


Fig. 21*A*

Fig. 21*B*

Fig. 22*A*

Fig. 22*B*

Fig. 23*A*

Fig. 23*B*

Fig. 21.—Nasal oddities: retracted foundation. Short lining. If in addition to the retraction of the bony foundation there is very great shortening of the nasal lining, this will have to be supplemented to make a satisfactory advancement. In this case the lip and face tissues were freed from the underlying bone, and the full circumference of the nasal lining and also the septum were divided completely through at the anterior nares. This allowed the nose to be drawn forward with a resulting annular defect in the lining. This defect was filled with two ends of a two-tailed, pedicle-flap raised from the left arm and let in under the lip, the arm being held in position with plaster of Paris and the nose held forward to a bar attached to a dental splint. When the flap had healed in place, the pedicle was cut and adjusted to the floor, and the fornix of the lip was sutured. The defect in the septum was disregarded. Later the bridge was filled out by a cartilage insert.

Fig. 22.—Nasal oddities: retracted foundation and nasal deficiency. In this case, in addition to the deficiencies described in Fig. 21, there is an actual lack of substance in the upper half of the nose requiring not only a piecing-out of the lining in front of the anterior nares, but also a supplementing of the skin and subcutaneous tissues over the bony bridge. This was done by the use of a two-tailed flap taken from the forehead and let in through a semilunar cut made across the bridge. On each side the ends of this cut extended down well into each ala-labial fold, and the thus outlined flap below was dissected from the underlying periosteum as far as the free edge of the bony bridge along which the incision cut through the lining and the septum. The forehead flap was let in through this incision and on each side, one tail sutured into the lining along both its borders, the two distal ends being brought together in the midline of the floor. This allowed the tip to drop down and forward to the desired position. Some three weeks later, after the base of the lining flap was divided and adjusted, the remaining part of the pedicle was turned over and used to fill the defect in the dorsum. Another three weeks later the base was cut and the remaining pedicle was adjusted into the forehead and the forehead defect was grafted. No cartilage was needed. Note that bringing forward the nose and foundation of the upper lip allows even the lower lip to assume a more pleasing contour.

Fig. 23.—Nasal oddities: nasal deficiency. In this case, the maxilla is not so much retracted as in Fig. 21, and there is not so much deficiency of the nose as is shown in Fig. 22, but it is short in both lining and covering. This man, whether subjectively or objectively, it is immaterial, was prevented from gaining the type of work he desired and to which his education entitled him and which he did obtain after operative correction. The correction was the same as for Fig. 22.

Less pronounced noses of this general type are not infrequently presented for remodeling, and several in which we simply implanted cartilage were, if anything, made more grotesque by raising the height of the bridge without lengthening the dorsal line. However, as in each case it appeared to satisfy the patient, we let it go at that.

A *B* *C* *D*

Fig. 24.—Trauma with displacement. *A* and *C* show a child five years old, who five weeks previously received a blow on the nose breaking the lower part of the quadrate cartilage and tearing the columella and vestibular lining. This drew the tip of the nose upward, and the columella had retracted between the alae into the vestibular space. Opening the scar in the columella gave access to the septum, and it was found that the quadrate cartilage had been split into two plates. The right half was pushed over until it obstructed the right vestibule, and the lower end of the other was curled upward submucously causing a complete obstruction on the left side at the junction of the vestibule with the nasal passage. The tissues were sutured in their proper relations, giving the result shown in *B* and *D*, with free air-way. Had this not been done early, a condition of the septum somewhat similar to that described under Fig. 26 would have resulted.

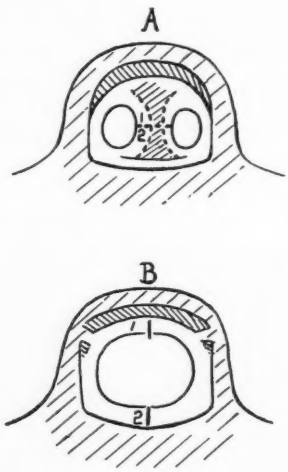


Fig. 25.—Trauma with displacement. *A*, a diagrammatic representation is shown of a supposed section through the posterior limit of the vestibule in a nose that had had a crushing injury of the bridge, and crumpling of the quadrate cartilage which had been allowed to heal without replacing the distorted tissues, leaving a flat bridge and an inadequate air-way. *B* shows the manner in which more breathing space was obtained. The obliquely striped crescent in *A* represents the supporting tissues, the nasal bones, and lateral cartilages. In *B*, this is shown as having been cut through on each side with a chisel, which, after the crushed septum was resected, allowed the bony and cartilaginous bridge to be raised upward, thus increasing the breathing space vertically. The transverse dotted line in *A* represents an incision through the quadrate cartilage and its mucous coverings which anteriorly and posteriorly met with vertical incisions extending from floor to roof. The mucous flaps outlined by this H-shaped incision were raised from the underlying cartilage upward and downward, and, after removing the intervening cartilage, the two upper flaps were sutured across at (1) to complete the roof, and the two lowers, at (2) to complete the floor of the newly formed and enlarged single breathing cavity. Such a newly raised bridge is held in place until bony consolidation takes place by a splint cemented to the maxillary teeth.

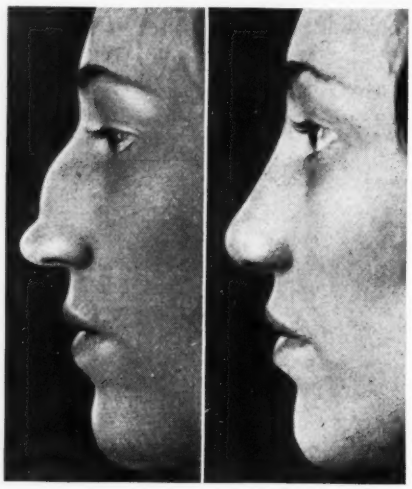
This is just one example of numerous plans that have been resorted to in the tedious effort to restore later a breathing space that might have been much more easily preserved immediately after the injury.

A *B*

Fig. 26.—Trauma with displacement. *A* shows external appearance resulting from a depressed fracture with malunion, seen twenty-six months after the injury. The depression of the bony bridge and of the upper lateral cartilage lessens the vertical extent of the air-way, and the crumpled septum and scarring of the lining occluded the remainder. After this length of time there was no thought of an attempt to replace the distorted septal fragments, and a classic submucous resection looked almost equally impracticable. No attempt was made to free and raise the depressed bony bridge because of the length of time that would have been required to get bony fixation that would be adequate permanently to hold the replaced nasal bones unsupported by the quadrilateral cartilage. The air-way was freed by removing the lower distorted part of the septum with some of its covering mucosa, but no raw surfaces were left bare. Later a piece of costal cartilage was implanted in the dorsum. Note that this is at least an average good result from a cartilage implant into the dorsum; there is a distinct rounding of the tip of the nose which is liable to be more or less objectionably evident in any case in which the attempt is made to hold the tip forward by means of a cartilage cantilever that gets its bearing from higher up on the bridge.

Fig. 27.—Growth distortion. This child received a blow on the nose; nasal bleeding occurred, but no displacement was seen. Some months later it was observed that the nose was inclining to the left, as shown. On the theory that this is due primarily to a growth distortion of the septum, he was referred to a rhinologist with the suggestion that the quadrate cartilage be entirely separated from its attachment to the maxilla and palate by the submucous removal of one centimeter or more of the cartilage throughout this entire extent. Although there was no visible correction at the end of several months' time, there was no further deformity, and it is possible that the deformity may even disappear somewhat with growth.

D. Obscure or questionable injury in infants or young children in which there is swelling of the bridge, and possibly a history of nosebleed but no evidence of a fracture or of cartilage displacement (Fig. 27). Often these are followed by increasing and ultimately severe deformity (Figs. 28, 29, 30, and 31). It is thought that the condition here is primarily due to some injury of or compression on the quadrilateral cartilage with subsequent banding and intense hardening of this structure, which is accompanied by a secondary distortion of the bony and soft tissues. In view of the severity



A *B*

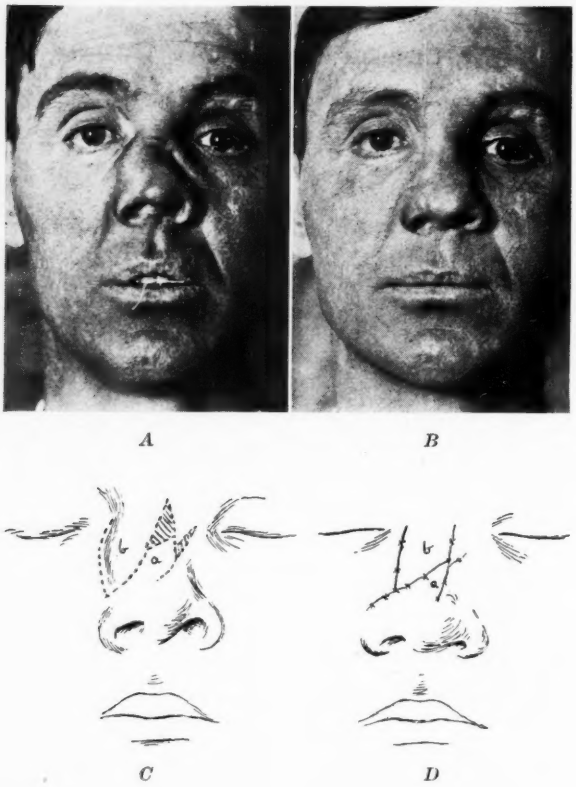
Fig. 28.—Trauma plus growth distortion. When this patient was five years old, she received a severe blow on the nose, but her parents observed no deformity until she was ten or twelve. At twenty-four years she presented the appearance shown in *A*. A front view shows little lateral deviation of the dorsal line which is usually quite marked in these cases of growth deformity following early injury. The left nasal passage had been practically occluded by the septal deviation. A submucous resection of this deviation had been done before the case was referred for improvement of the external contour. Sometime later through an incision just inside of each nostril and crossing the skin at the anterior end of the columella, the nasal covering was elevated and freed from the underlying bony and cartilaginous frame throughout its whole extent. At the greatest prominence of the dorsal hump, just at the lower border of the bony arch, a cut was made into the quadrilateral cartilage, first dorsally and then downward and forward, liberating a small mass of cartilage which remained attached below by a hinge pedicle of soft tissue. This flap of cartilage was turned down on its hinge and filled the triangular notch seen just above the tip in *A*. Then the remaining part of the cartilage-bone hump was removed clearly with a five-eighths-inch flat chisel, leaving the free edge of each cut nasal bone separated from the cut septum by the open anterior prolongation of the nasal fossa on each side. A narrow flat chisel was passed upward through the posterior part of each intravestibular incision until it engaged the bony edge of the anterior nares below the nasal bone on each side. With one finger in constant touch with one corner of the chisel, felt through the skin along the outside of the nose as a guide, the chisel was driven upward cutting at the depth of the valley between the nose and the maxilla. This bone cut usually starts below the nasal bone proper, but, at any rate, the bony side walls are loosened until the anterior cut border of each nasal bone can be made to fall medially into contact with the cut edge of the septum. This procedure does away with the truncate appearance that remains after simply chiseling off a hump. The cartilage flap was turned down and anchored by means of one split silk suture and the skin incision was closed with drainage. *B* shows the result forty days after operation had been performed. Some swelling about the tip of the nose is still evident.

which such changes may reach, it is good routine practice if consulted early to give an anesthetic and forcefully pry upward on the nasal bones from within, on the chance of correcting some slight displacement. At least this would eliminate a rather common subsequent imputation of negligence. If seen after the aberrant growth of the septum has become evident by external distortion, it is equally good practice to have a sympathetic and competent rhinologist remove submucously the lower third of the cartilaginous septum. This tends to destroy the "foothold" that appears to be an essential factor

XUM

A *B* *C* *D*

Fig. 29.—Early trauma plus growth distortion. Trauma was not evident in this history, but such an occurrence might so easily be overlooked or forgotten that as a cause it cannot be excluded. There were no external scars and in spite of the S curve of the dorsum, an attempt was made to shift the bones and septum, immediately after submucous resection of the latter. The external nasal covering was dissected free and intramural bone cuts were made. Anchorage was made by a wire loop passing from the outer lower corner of the liberated right nasal bone to a left molar tooth. This not proving satisfactory, an adjustable splint with dental anchorage (see Fig. 44) was substituted, but this also failed of the desired effect because of the distorted dorsal border of the stiff, inelastic septum. At a subsequent operation the remaining bulge to the right, of both bone and cartilage, was removed after reelevating the covering. Three months later a new dorsal line was established by the insertion of a strip of costal cartilage. The result shown in *B* and *D* was photographed eighteen months later.



A *B*

C *D*

Fig. 30.—Early trauma plus growth deformity. When six years of age this patient was kicked by a horse. Immediate deformity not as much as developed later. In cases with so much irregular bony distortion and complicated by scarring, the simplest type of correction may be by shifting osteoplastic flaps of bone and skin (Fig. 30, *C* and *D*). The flap in *C* was anchored by a wire attached to a left molar tooth. Scars on the nose from well planned cuts properly sutured become practically invisible if there is not unnatural tension. At the same operation a submucous septal resection was done to relieve the obstruction. This type of operation permitted the work to be done at one step, and patient was under observation altogether but twenty-one days. *B*, taken nineteen days after operation.

A *B*

Fig. 31.—Trauma: growth deformity. In this fifteen-year-old boy, the lower part of the dorsal line that corresponds to the border of the quadrate cartilage deviated to the left, and in *A*, the lower border of that cartilage can be seen obstructing the left vestibule. A slight deviation of the bony bridge to left did not warrant direct attack on nasal bones. Correction consisted in submucous mobilizing of the lower anterior part of the cartilage, leaving the perichondrium attached to the cartilage. The septum, including nasal spine, was cut free from floor of nose for half the distance back, and the spine, with attached septum, was anchored a little to right of midline by a wire loop attached to a right molar tooth. Wire left in place twenty-six days; no tendency to recurrence of displacement after removal.

A *B* *C* *D*

Fig. 32.—Congenital deformity plus growth distortion: harelip. The whole primary fault in a "harelip" is a simple failure of a normal cleft to close at the natural time. From then on the growth of the surrounding tissues becomes increasingly distorted, the amount being somewhat proportionate to the extent to which the cleft remains patent, and the time elapsing before a proper adjustment and closure is made. In nearly all such, no matter how slight the cleft, there is a droop of the lower lateral nasal cartilage which gives form to the ala, and a spreading and a backward displacement of the nostril. In one-sided clefts, there is also a deviation of the whole nose to the opposite side, with a deviation of septum and flattening of tip on cleft side.

Early forceful wiring of the maxillae to close the bony cleft does not itself correct the above mentioned nasal displacements described, and, in addition, may be followed by a lack of forward progression of the anterior part of the maxilla, early loss, and malrelation of the teeth, also a droop of the tip of the nose, and, due to the maxillary retraction, backward displacement of the upper lip and of the lower part of the nose. In this patient the deformities present at birth could have been corrected, further distortion prevented, much grief and many useless operations avoided if a simple, proper adjustment had been made of the soft tissues of the lip and nostril at the original operation in early life.

The correction here shown was done when patient was seventeen years of age and consisted in splitting the columella between the cartilages, rotating the right nostril into proper position, and opening and resuturing the lip. At a second operation the lips and cheeks were freed from the septum, and the maxilla and this mass of soft tissues were advanced on the underlying bony and cartilaginous framework and sutured in this new position. After healing, a prosthesis that carries canine and incisor teeth and which holds forward the upper lip was made by her dentist.

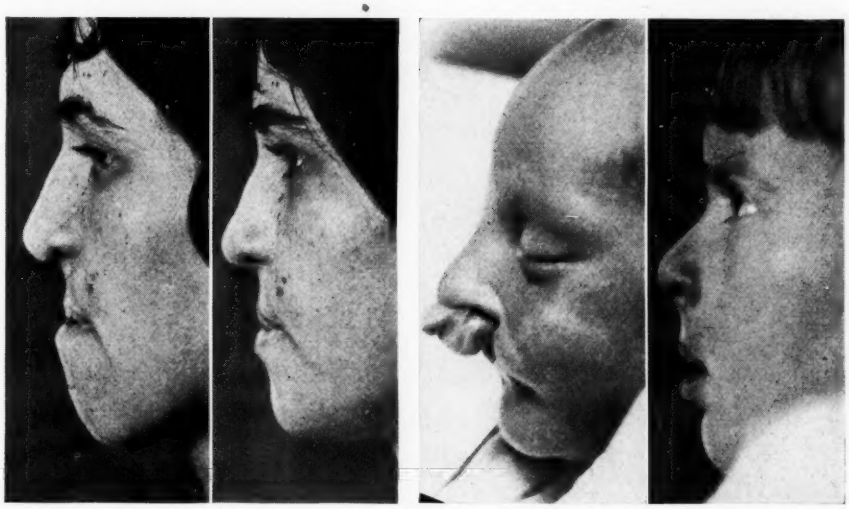


Fig. 33*A* Fig. 33*B* Fig. 34*A* Fig. 34*B*

Fig. 33.—Congenital deformity plus growth distortion: harelip. Case similar in origin and history to that shown in Fig. 32. Besides the distortion of the nose, lip, and maxilla, this girl had also an abnormally long chin that was shortened by removal of part of the lower border of the bone to give a more pleasing balance to the face shown in *B*.

Fig. 34.—Congenital deformity: double harelip. With the complete double "harelip" the distortions are different but still more pronounced, the most striking feature being the forward displacement of the premaxilla and prolabium on the columella, as in *A*. If the septum is cut across behind the displaced premaxilla and the latter forced backward at time of original closure of lip, it is liable to drop in between instead of remaining in front of halves of maxilla. This results in a snubbed nose, a retracted upper lip, and a bony palate cleft difficult to close. Four correlated operations close the palate and lip rather satisfactorily as in *B*.

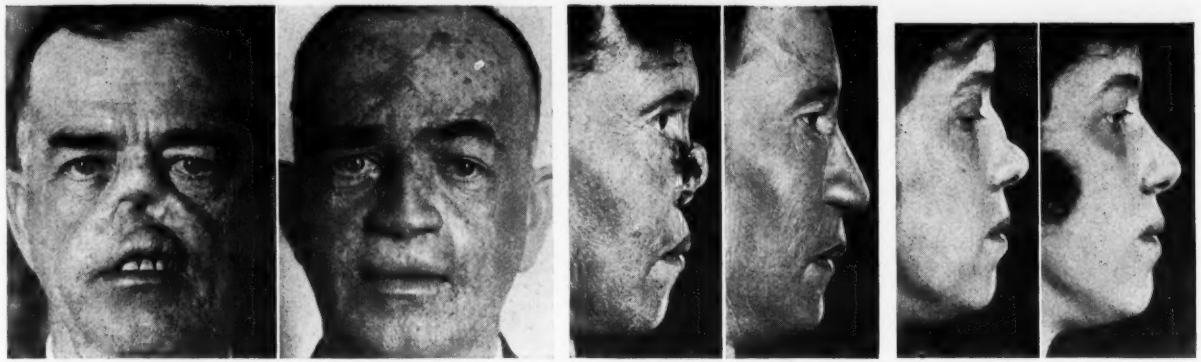


Fig. 35*A* Fig. 35*B* Fig. 36*A* Fig. 36*B* Fig. 37*A* Fig. 37*B*

Fig. 35.—Soft tissue restoration: nose, lip, and cheeks from forehead. Resulting from an ulceration, this man had lost much of nose, lip, and cheeks as shown, and, in healing, the anterior nasal opening was almost obliterated. Restoration consisted first in using the remaining covering of the nose to line newly made anterior nares. Next, the lip and cheek were restored from a flap taken from the right side of the forehead with its pedicle attached at the zygoma and containing the temporal artery. After this had healed in place, the cut pedicle was restored to the temple. The nose itself was made with a flap taken from the left side of the forehead with the pedicle attached at the inner end of the right brow.

Fig. 36.—Prosthetic inserts: foreign substances. Foreign supporting substances implanted within the tissues may not prove satisfactory. Being foreign bodies, any of them may tend to shift or be extruded, or, in the case of paraffin, may set up a serious reaction. Nineteen years previously, correction of a depressed bridge had been attempted by the insertion of a silver plate which, following a blow on the nose six months previously to the photograph shown in *A*, had partially cut its way out. Judging from the appearance of *A* it is likely that while in place it was a better technical than artistic result. On removing the plate the tissues were found to be deeply stained with copper. The remaining external covering of the nose was used to build forward the lining, and the floor was advanced by two cheek flaps. The nose itself was made from a forehead flap which, on account of scarcity of material, was too short to let the ala go down to the proper place. Also, on account of poverty of the lining-flap, the nostrils are rather small, but this is overcome by wearing concealed tubes that insure easy breathing space and do not seem to inconvenience him. The dorsum and tip were later filled out with a cartilage insert.

Fig. 37.—Prosthetic inserts. The falling in of the bridge and slight uptilt of the tip in this case resulted from the loss of the quadrate cartilage from an acute pus infection. The correction was done with a piece of costal cartilage inserted through an incision within and parallel to the border of the nostril, and through which the entire nasal covering was dissected free from the underlying bone and cartilage. For making an interstitial prosthesis, costal cartilage has the great virtue of being easily molded and of remaining permanently after it once heals in, if sufficient perichondrium has been retained to insure its nutrition. It is inclined to heal in kindly if properly handled, even if the field becomes mildly infected. The two great objections that can be brought against its use are that the patient himself should furnish it and also its variable tendency later to curl up and become distorted. Some costal cartilage is yellowish and somewhat translucent, and this kind has little tendency to curl except where a comparatively thin strip is left with perichondrium on one surface only. Then it will bend with the concavity toward the perichondrium; this can be controlled by transversely cutting the perichondrium and the immediately underlying layer of cartilage at short intervals. Other cartilage is opaquely white, and this has a much greater tendency to curl. With such, after the insert is cut to the proper shape, it is transversely cut as deeply and at as short intervals as seems possible without its breaking while being inserted. Elimination of blood clots and maintenance of pressure are of the greatest help to insure clean healing (see Fig. 70). It is equally important to have the cartilage heal in the desired position, and to insure this, it is fixed in place by horsehair sutures that penetrate both the covering and the lining of the nose all around the insert, and sometimes even transfix the cartilage itself.

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in producing the increasing bony and cartilaginous distortion, and should be done as soon as a definite deformity is detected, the standard dictum in regard to septal resection in children being disregarded (see Fig. 27).

E. Another common instance of growth distortion is the increasing lateral displacement and alar droop which is more or less marked in cases of harelip where the proper relation of the base of the columella to the labial attachment of the ala is not restored at an early period of life (Figs. 32, 33, and 34).

F. Actual loss of part or all of the nose and possibly part of its foundation, either from accident, injury, or disease, the remaining parts possibly having become displaced by scar or abnormal bony growth (Fig. 35).

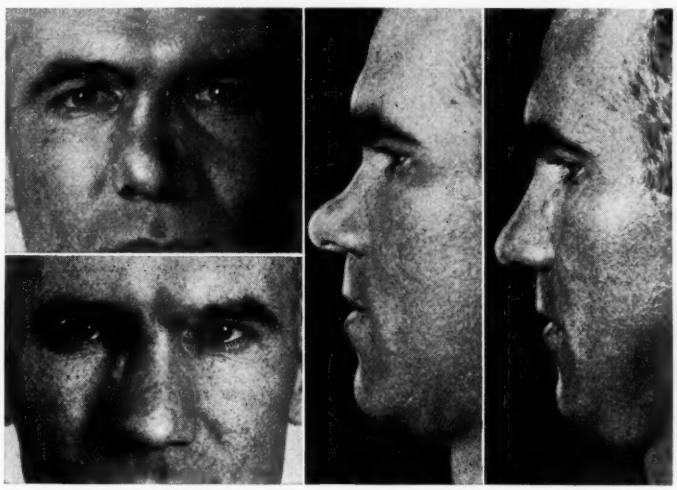


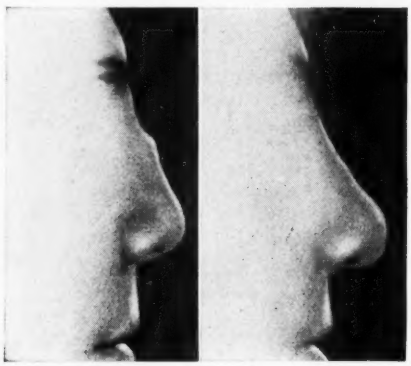
Fig. 38.—Trauma with displacement. *A* shows that the bridge has been pushed back, more on the left than on the right side, and has also been displaced slightly to the right. In correcting this the cartilage insert has to be cut accordingly. These cartilages should be cut as exactly as possible to the pattern, but when in doubt some allowance may be made for slightly greater lateral bulk and length. If the extra allowance has not been too great and the cartilage has been properly placed, it can be conveniently carved to a more desirable outline after it has healed firmly in place, as was done in this case. This, however, requires that the dorsal covering be again raised. Where the depression is symmetrical, as in Fig. 37, the pattern is cut from two pieces of flat sheet-lead, one for a longitudinal and one for a transverse section; but in the above, a three dimension lead pattern was cast in an oven-dried plaster mold made from a clay model built up on the cast and removed without distorting it. The bulge of the nasal bones to the right still shows a little, more noticeable in the photograph than in the flesh. Had the lateral displacement been any more marked, it would have been advisable to have carved it with a chisel before implanting the cartilage. This is an extra step, to be avoided where unnecessary.

In the correction, each individual damaged or lacking component anatomic element, lining, covering, and supporting framework must be restored, but first any active disease or infection must be eliminated; and, as a preliminary operative step, distorted tissues must be liberated and replaced.

Incisions. When necessary, external incisions may be made on any part of the nose, because if properly sutured and if there is not abnormal tension, the scar will ordinarily become unnoticeable. For implantations, molding of the bony bridge, and bone excisions, the incisions are made parallel to, and just within, the nostril border, but for better access, the intravestibular incisions can conveniently be combined with one made externally across the columella just under the tip. This places it in a rather invisible site, and allows the skin cover-

A *B*

Fig. 39.—Normal but displeasing. In these days of candor and open discussion, public education, etc., the flat nasal bridge may be resented by its host, not only for its asymmetry but from a deeper possible significance of an inherited or acquired luetic causative factor. In *A*, the depression is a natural one and to the trained clinician there is no suggestion of luetic origin. However, many seek a correction of a naturally somewhat depressed nasal bridge, and for that purpose we use a costal cartilage implant that avoids giving any suggestion of a dorsal convexity (Fig. 39 *B*).



A *B*

Fig. 40.—Prosthetic inserts. The tendency of costal cartilage to curl is increased if a bending strain is placed upon it. One case came under observation in which such a pillar of costal cartilage had been implanted into the septum just above the columella which was holding up the tip a number of months later. Ordinarily, this might have been considered a good result, but the subject was a movie actress and was seeking further correction on account of the resulting extra width, deviation to one side, and downward displacement of the columella, and its unnatural pillar-like appearance.

One can more or less successfully use an implanted mass to bring forward a depressed nasal tip if there is a sufficient resistant foundation of depressed dorsum upon which to rest the longer base of the lever. But a thin long strip is liable to bend, and if any major part of the anterior lower portion of the quadrate cartilage is missing, a short implant is more liable to be drawn backward than to hold the tip forward. It has been advocated to put a supporting pillar into the septum along the upper border of the columella, but this we do not use because of the belief that the width of the piece required would impinge upon the breathing space and because of the danger of its bending or being extruded under strain. *A* shows outline of a nose in which, following a pus infection of the quadrate cartilage, there was sufficient loss of the lower part of the cartilage to permit of a retraction of the tip with lessened air-way. Someone had attempted to correct this by putting in a dorsal mass of cartilage supported by a mortised pillar of cartilage in the columella. As the supporting pillar gradually gave way, the tip dropped and the upper end of the dorsal piece tilted forward as can be seen. There being no upper fixation of the insert, it is probable that there never was enough downward thrust to give proper length to the dorsum. Relief was again sought not only on account of appearance, but because the rhinologist who referred the patient attributed headaches to the partial obstruction to the free entrance of air into the vestibule. At the operation both pieces of the original insert were removed, and a piece of a rib cartilage graft was inserted in such a way that the upper end of the graft could ossify to the nasal bones to make a rigid support to the tip. The lower end of the graft was of cartilage. The tip, with its contained part of the graft was held forward, with an intranasal splint fixed to the maxillary teeth, pending firm union with the nasal bones above (see Fig. 44). In this particular case, in spite of a stormy convalescence due to an autogenous infection of the graft, from a pimple, thirteen days after its insertion, and subsequent partial sequestration, the remaining part healed in place. See Fig. 40 *B*, taken nine weeks after the insertion of the graft.

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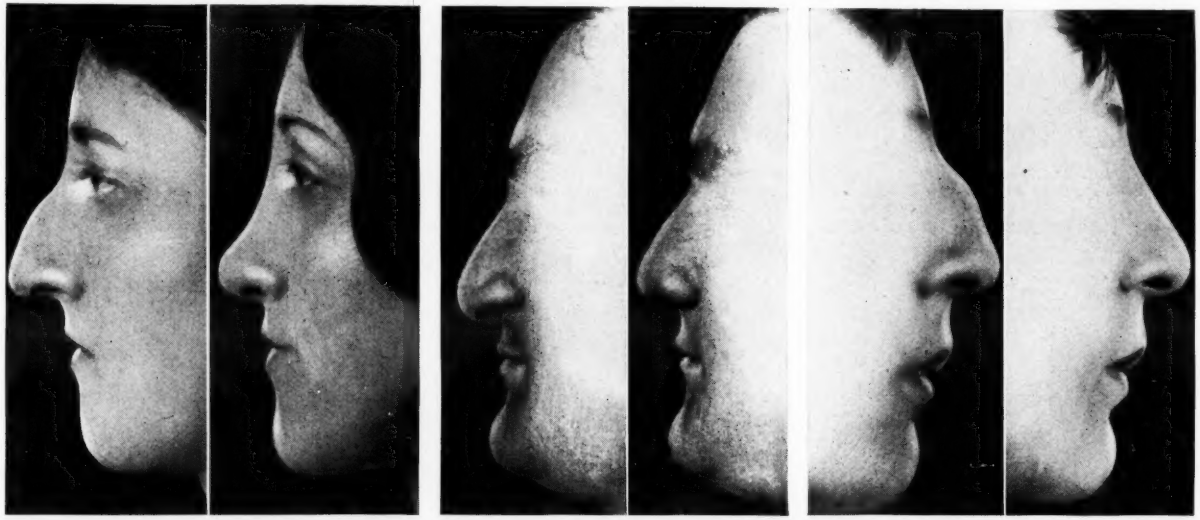


Fig. 41*A* Fig. 41*B* Fig. 42*A* Fig. 42*B* Fig. 43*A* Fig. 43*B*

Fig. 41.—Normal but lacking harmony. Here the forehead, nose, and upper lip are of classic mold but are out of harmony with the rather large bold chin. The patient had her mind focused on the nose; therefore that was the feature to be changed. In the aquiline nose the excessive vertical length, the elongation of the nostrils, and the width of the base are camouflaged by the dorsal convexity or "knee," and these all become strikingly evident as soon as the hump is removed. Therefore, one will save the risk of trouble and disappointment if, when needed, the nose be also shortened and the bridge made narrow all at the same operation. In these pronouncedly aquiline noses, the nostrils are likely to be very narrow and the upper lip drawn upward until in effect the latter is shorter than in reality. In some, attempts at forced inspiration will cause collapse of the ala with partial obstruction. Note in *B* that with the raising and shortening of the tip the nostrils have become more rounded and the upper lip has dropped downward, also that her rather prominent chin has become less noticeable.

Fig. 42.—Normal but displeasing. In this case both the convexity of the dorsum and the droop were objected to, but studies of experimental changes made on gelatin molds seemed to warrant the conclusion that the length and overhang were the major factors, and that a stronger face would result from correcting these, and allowing the slight dorsal convexity to remain. He had also a partial obstruction due to a deflection of the lower border of the quadrate cartilage into the right vestibule. We first attempted the correction by raising up the skin covering and submucously removing a good-sized triangle from the lower end of the quadrate cartilage which included the obstructing portion within the right nostril. Wedges were also removed from the upper lateral cartilages and the edges closed with split silk. After healing had taken place, the result was still not satisfactory, and, at a second step, the columella was narrowed and raised, and a straight line given to the under border. Though the patient expressed himself to the contrary, we still are not certain that he was perfectly satisfied with the result.

Fig. 43.—Normal but displeasing. This high type nose of somewhat ample proportions was wished upon a very attractive, petite young lady of ingénue type, and no one could blame her for desiring a change. This was accomplished by chiseling off the excess of bone and cartilage after raising of the nasal covering, by chiseling loose the remaining part of the bridge on each side, and by drifting the liberated nasal bones mesially, until both the dorsum and the base were of a pleasing width. Note that the dropping back of the soft tissues of the nose has allowed the upper lip to come in contact with the lower without strain. In this manner the expression of the mouth has been improved.

A *B* *C*

Fig. 44.—Trauma with displacement: fixation-dental splint. Bony distortion whether resulting from distorted growth or malunion that requires section and replacement will also require fixation in its new position for two to four weeks. If the replaced bridge requires to be held forward, or forward and to the midline, this can best be done with an adjustable splint attached to a dental piece cemented to the teeth. *A* shows a growth distortion and also the scar of a recent excision of the right lacrymal sac. *B* shows the splint in place where it was maintained for some four weeks. *C* shows the result.

ing to be dissected upward to display all structures below the middle part of the bony bridge. Unless the vibrissae are exceptionally thick or long, it is possible, and we have concluded advantageous, to disregard them and make the intravestibular part of the incision between the hair and the border of the nostril.

Saddle Nose. For the saddle nose, various inert substances are advocated for implantation under the skin to fill out the depression. These include rubber, gutta-percha, celluloid, ivory, metal, etc. (see Figs. 63, 36, and 51), as well as autogenous live grafts of bone or cartilage (Figs. 37, 38, and 39). We prefer the latter, but have used ivory when cartilage transplant was contraindicated, and a rib costal cartilage graft when rigidity was desired to support the tip (Fig. 40).

The humped or aquiline nose is more liable to be too long than too short and to have a drooping tip. Dorsal humps may be removed with a saw, chisel,

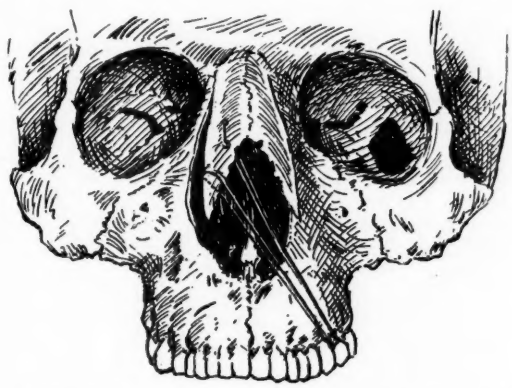


Fig. 45.—Trauma with displacement: fixation-dental wiring. Lateral displacements if seen early can be pushed to the midline, and if the septum has not been broken, it will likely retain the bridge in its natural position when the impaction is released. If there is a tendency for the displacement to recur, it can be effectually fixed in one of two ways. When there is no backward displacement, the bridge can be fixed by a silver wire which engages the lower edge of the bony bridge on one side, runs through the vestibule, and transfixes the soft tissues to be anchored to a molar tooth on the opposite side. If the continuity of the bridge is too much damaged, then an adjustable bar fixed to a maxillary dental splint is used. The latter is a more complicated method but has a wider field of usefulness (Fig. 44).

In cases which are seen later it may be necessary to mobilize the bridge with a chisel before it can be replaced. (The retaining wire may engage the bone through small drill holes which are made through a small external incision.)

or a rasp. Use of a saw for this purpose requires the highest quality of skill. The field for the rasp is limited and the results are liable to fall short of being satisfactory. With a chisel, one may remove as much offending bone as desired, in one piece or bit by bit, but great care should be taken not to leave bone fragments or raspings behind, as they may lead subsequently to deforming thickening. A sharp lateral biting forceps that will cut on only one side and is slim enough to work through the intranasal incision, is very convenient for removing pieces from the dorsal border of the quadrate cartilage and slight irregularities from the chiseled bone. At this same operation the nose can be shortened and the droop corrected by removing wedge-shaped sections from the columella, and from each lower lateral cartilage and contiguous vestibular lining. Sometimes the full thickness of the wall must be included. The "truncate" appearance that remains after a marked dorsal hump is removed is corrected by shifting the nasal bony supports inward, after they are chiseled

free from their maxillary attachments. By cutting the lower lateral cartilages and molding the tip, some more or less pleasing compromise between what is desired and what constitutes good surgery can usually be obtained here. All of the above mentioned operative plans might be included under a heading of intramural operations, and are done through concealed incisions (Figs. 41 and 42, and 43).

Fractures and Malunions. In displaced recent fractures, little is required but, possibly, forceful release of the impaction with replacement and splinting. Displacement in any direction can be controlled by an adjustable splint attached to the teeth (Fig. 44), but a lateral deviation may be anchored by an interstitial wire attached above to the mobilized nasal bridge and below to a molar tooth of the opposite side (Figs. 45 and 46). Through-and-through wiring penetrating the fracture lines across the base of the nose, fastened over lateral lead plates

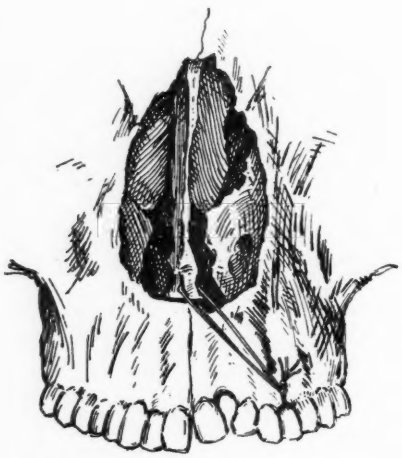


Fig. 46.—Trauma with displacement: fixation-dental wiring. In the correction of an old displacement of long standing whether due to distorting growth or malunion, it may be necessary to free the lower border of the septum from the maxilla in order to shift it laterally one way or the other. It can be conveniently held in place as shown in this figure.

on the two external sides of the nose might satisfactorily restore the prominence of a sprawled-out nasal bridge, but intranasal packing is rarely sufficient. Fixation may be gotten with plaster of Paris head casings, but in these there is always considerable movement. A nose cannot be crushed in without either tearing or crumpling the quadrilateral septal cartilages, and this should be immediately straightened to its natural position and all gaping tears in the lining should be repaired when the bridge is elevated. The replaced septum gives support to the bridge, but if it is left crumpled or torn, it constitutes a permanent nasal obstruction (see Fig. 24). For malunions or growth deformities, the chisel may have to be used freely (Figs. 47, 48, and 49).

Soft Tissue Losses. For replacing a damaged or lost nasal covering there is nothing so satisfactory as a skin covered flap of forehead tissue (see Figs. 4 and 35), but perforce we have used pedicle skin flaps from the arm (Figs. 50 and 51), and from the chest (Fig. 52, see Fig. 66). For relatively small losses from the nasal covering, a pedicle flap may be taken from the fold of skin and subcutaneous tissue that runs alongside of the nose downward and

XUM

Fig. 47*A* Fig. 47*B*

Fig. 48*A* Fig. 48*B*

Fig. 49*A*

Fig. 49*B*

Fig. 47.—Trauma with displacement. A blow directed backward and maybe upward has a crumpling effect that both flattens and shortens the nose. If this is not immediately corrected, it is difficult to restore the length later. *A* shows a nose that received such an injury and was seen by us five weeks later. The nasal bones were then pried forcefully forward to tear open the partially united fracture lines, and held forward with an adjustable bar splint attached to the teeth. There had been a tear in the lining of the right vestibule which in the scarring had drawn the border of the nostril upward on that side. This was connected by a "V-Y" operation in the lining of the vestibule.

Fig. 48.—Trauma with displacement. *A* shows the profile of a girl who from a blow between the eyes, in an auto accident, had the nasal bones driven in between the nasal processes of the maxilla and the sputum crumpled, changing what had been a high aquiline nose into the form shown. Evidently her general condition immediately after the accident did not permit of these bones being pried forward and held in their proper shape and position, and when seen later they were too firmly fixed to be moved in the original fracture planes. Correction was attempted by inserting a chisel in each nostril and cutting the bony nose free at as deep a plane as possible, and including with it some of the bony floor of the frontal sinus. This mass was pried as far forward as possible and held with a splint. Later after new bony fixation had occurred, a cartilage was inserted to bring the bridge still further forward.

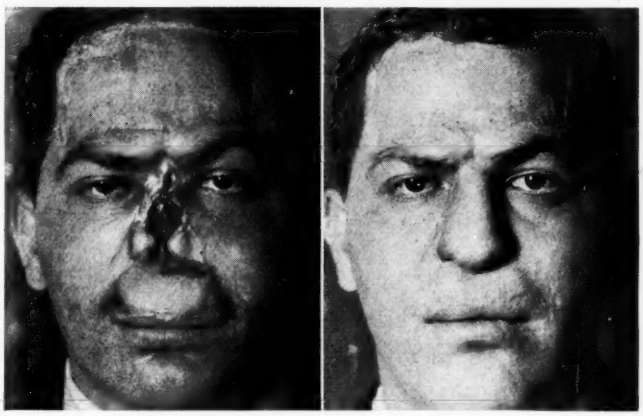
Fig. 49.—Trauma with displacement. A blow on the bridge which flattens and spreads the nasal bones may also thrust outward the nasal processes of the maxilla and the lacrymal bones, thus widening the distance between the internal canthi. This displacement of the canthi can be very noticeable with relatively little flattening of the bridge. If seen early, it is likely that as the nasal bones are pried forward, the bones at their base could be squeezed mesially either with thumb and finger, or with forceps passed into both orbits mesial of the lacrymal sacs. We have never seen one of these early but have later made the correction through an incision on each side similar to that for removal of the lacrymal sac. Working back between the sac and periosteum, the former, surrounded by its related tissues, is pushed outward to expose the bony mass. This is removed sufficiently in all directions to allow the canthi to be brought to their normal position and also to narrow the nasal bridge properly. In doing this the internal palpebral ligament is cut, and its bony attachment is removed, but the dorsal border of the bridge is preserved. The internal tarsal ligament is replaced by a loop of No. 00 forty-day catgut that enters and emerges within each inner canthus, the strands passing in front of the lacrymal sacs and straight through the nasal cavities and also the septum, the knot being tied at one canthus. As the knot is drawn tight, the canthi are pulled inward and will become fixed there by the scar before the catgut has become absorbed. *B* shows the correction obtained by this method.

Fig. 50*A* Fig. 50*B* Fig. 51*A* Fig. 51*B* Fig. 51*C* Fig. 51*D*

Fig. 50.—Soft tissue restoration: tip and ala from arm flap. *A* shows a young woman who lost the tip of the nose and median half of each ala from an accident. The repair, which was made from an arm flap, proved quite satisfactory except for the fact that it grew long fine hairs all over it. These were permanently destroyed with radium but the dose was sufficient to cause a slight shrinking of the tissues as shown in *B*. Radiation for depilation we use only in exceptional cases and have never found it perfectly satisfactory.

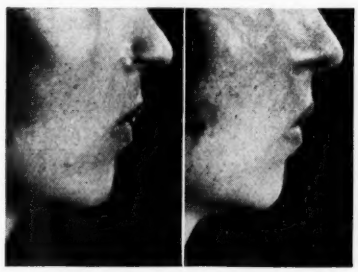
Fig. 51.—Soft tissue restoration: tip from arm flap. A loss of the tip that extends into the nostrils calls for restoration of lining and covering as well as the nostril border. This requires a flap that is not only large enough to restore the tissue actually lost, but to obtain a blood supply in its new location. In this case the flap was taken from the arm.

outward on the cheek (Figs. 53 and 54). This is more pronounced and more usable in middle age than in youth. Surface skin defects can be repaired by free full thickness skin grafts taken, preferably, from behind the ear (Fig. 55). Large areas of loss, especially if these include the subcutaneous tissue, are better restored by a forehead flap that has seasoned long enough to allow it to be sufficiently thinned, without risking blood supply (see Fig. 64). One



A *B*

Fig. 52.—Soft tissue restoration: nose and upper lip from chest and forehead flaps. In this case it was necessary to remove practically the whole nose and the full thickness of the lip, except the vermilion border because of an infiltrating paraffinoma. This was done with a cautery, and while waiting for the burnt bone to be thrown off, and the wounds to clean up, one flap was prepared on the forehead to make both lining and covering of the upper lip, and one on the chest for the nose. *A* shows the step at which the gross restoration of the lip had been made and the defect on forehead recently grafted. *B* shows the finished case with final adjustment of the lip and completion of nose with cartilage implant. The arm or chest flap is thicker and softer than one taken from the forehead; is liable to be of an off color and not capable of same amount of molding.



A *B*

Fig. 53.—Soft tissue restoration of ala by a cheek flap. Following the removal of a small growth and repair of the defect, the patient was seen with this condition. There is a normal lateral overhang of the ala, the loss of which is very noticeable even though the wall of the nostril is intact. In this case a flap was turned from the fullness of the cheek contiguous to the upper lip base above, and apex just above the corner of the mouth. The borders of this cheek defect were sutured together, leaving a temporary drawing up of the lip, and a scar that is so inconspicuous that it does not show in the photograph.

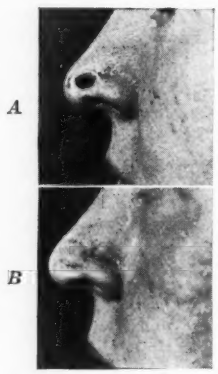
can sometimes line a small full thickness defect by a pedicle skin flap raised immediately adjacent to the defect. The raw surface which results after turning these lining flaps is double the size of the original defect and is covered with one free skin graft (Fig. 56). Free split skin grafts are appropriate to restore the nasal lining in areas in which the supporting framework is intact (Fig. 57), but, for restoration where the lateral cartilages are damaged or

A *B*

Fig. 54.—Soft tissue restoration: vestibular wall from cheek flap. This thirteen-year-old boy had a piece lost from the nasal wall, and the lip injured by the bite of a dog six months previously. Repair was made from a cheek flap taken from just external to the nose, base toward the inner canthus and pointing toward the corner of the mouth. At the same time the flap was raised, the lip scar was opened and resutured; the ala scar was also excised up to base of the flap. The cheek defect was sutured closed, which drew remaining part of ala outward; this in turn enlarged the nasal defect sufficiently to receive a flap. This was sutured in place, its end being doubled under to form alar border and lining of vestibule. *B*, result three years after the operation.

A *B*

Fig. 55.—Soft tissue restoration: surfaced with free skin graft. Where the lips and cheeks are also burned, restoration of these by surface grafts will contribute to the nasal improvement. In this case, besides the split skin grafts that corrected the ectropion of the lips, the drawn-up tip of the nose was released by a diamond-shaped full thickness graft put in across the dorsum. The irregular scar on the side of the face and under the chin could be further improved by more extensive surface grafting.



A

B

Fig. 56.—Soft tissue restoration: lining from neighboring flap and covering from skin graft. In this patient the plan used in Fig. 63 was somewhat reversed. The lining was made from a flap of the external surface bordering the defect which was turned in on a broad pedicle, and the external defect, which then was of the size of the original defect plus the area of the turned-in lining flap, was immediately filled with a full thickness skin graft taken from behind the ear. This allowed the operation to be completed at one step. The area from which the skin graft was taken was completely hidden by suturing the borders of this defect in the crease where the ear joins the skull.

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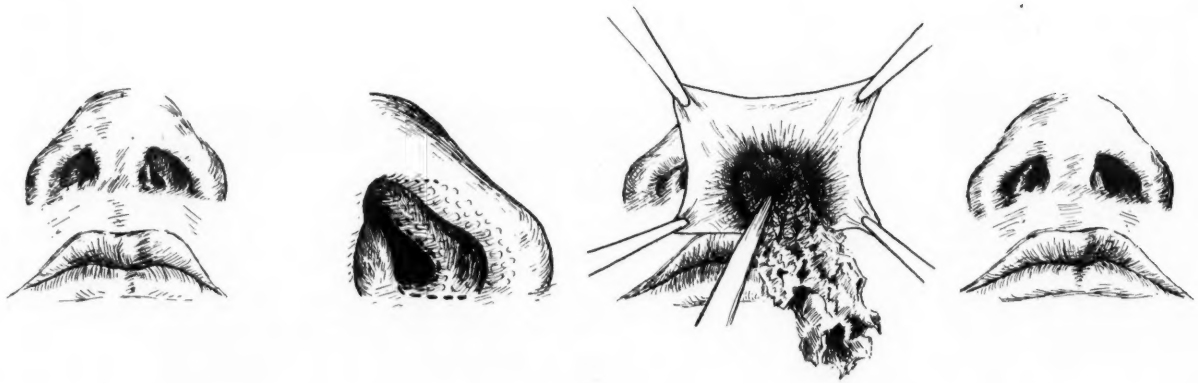
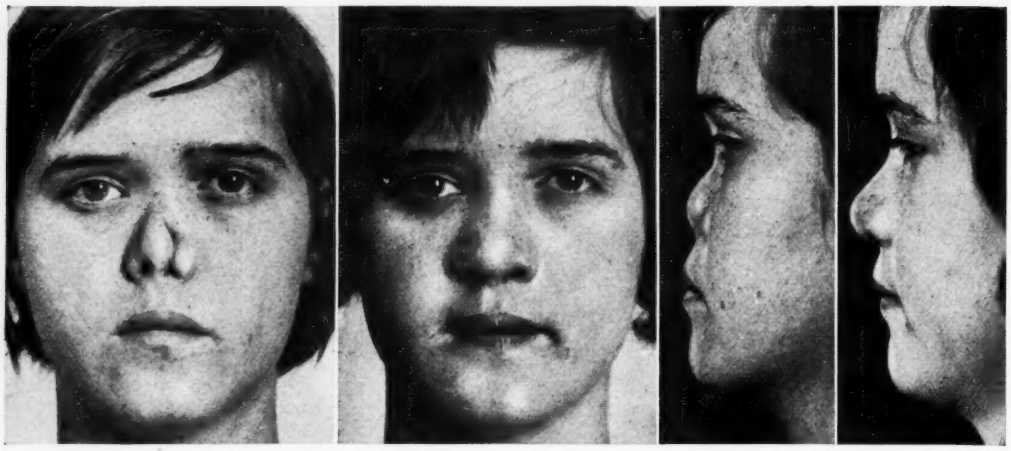


A *B* *C* *D*

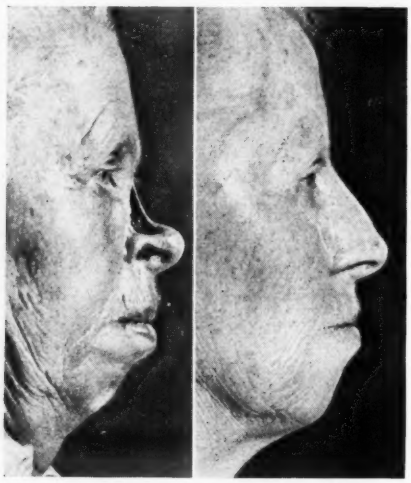
Fig. 57.—Soft tissue restoration: lining by a free skin graft. Free skin grafts of less than full thickness have a very definite tendency to contract and we therefore do not use them in places where allowance cannot be made for this. In certain losses confined to the vestibular lining that obstructs breathing space the most satisfactory restoration is made by a free split skin graft put in on a sponge or gauze, that expands the nostril to about twice its normal size without causing undue pressure. The graft being thin does not of itself add to the obstruction. Sometimes this must be repeated even more than once.

In cases in which one rearranges the lining by shifting flaps of skin or mucosa, and in which bare areas remain they can be epitheliated by covering the packing with a split graft. No attempt is made to conform the graft to the size of the defect and a piece of skin at least two inches across is used like the covering of a Mikulicz pack.



A *B* *C* *D*

Fig. 58.—Soft tissue restoration: lining from arm flap. Where the cartilage as well as the lining is missing, even though the skin covering is intact, then a pedicle flap rather than a free skin graft is required. In this case a flap taken from the arm and having been made as thin as possible was let in by cutting the columella transversely just back of the lip. Later, after the pedicle of the flap was cut and adjusted, the columella was resutured in place. The tip was raised but a little too much rounded out by inserting a piece of costal cartilage.



A *B*

Fig. 59.—Soft tissue restoration: partial lining and covering from forehead flaps. The above represents a complete loss, covering, lining, and supporting tissue over a part of the nose with healing of the wound and scar contraction that distorts the remaining part. The correction must not only restore the loss, but also bring the displaced parts to their proper positions. The former was done by two pedicle flaps from the forehead, into one of which a strip of costal cartilage was implanted before bringing them down. At the time these previously prepared flaps were brought down to the nose, all binding scar was removed so that the ala and tip could be brought down to the proper level, as shown in *B*. Though in this case the costal cartilage that gives prominence to the dorsum was implanted into the lining flap before the latter was brought down, it is usually a better and safer practice to restore the lining and covering completely to allow these to heal in for some months before inserting the cartilage. This, however, adds an extra step to the operation (see Fig. 36).

part of the full thickness of the nasal wall is missing, we prefer skin carried in on a pedicle flap because it does not shrink (Figs. 58, 59, 60, 61, 62, 63, and 64).

A missing columella can be restored by a flap from the lip or cheek or forehead (see Fig. 61), but we usually resort to a hand or wrist pedicle flap to get more tissue and avoid a noticeable scar (Figs. 65 and 66).

The nose, like a house, requires a foundation upon which to rest, and, when the foundation is lacking or deficient, it must be restored or supplemented (see Figs. 3 and 35).

The Air-way. The nose is an organ of respiration; therefore, free nasal breathing should be insured. Raising the drooping tip or lengthening the

A *B* *C* *D*

Fig. 60.—Soft tissue restoration: tip from forehead flap. Shows a boy who lost the tip of the nose from the bite of a horse. In this as in the preceding case the flap had to be formed so as to replace the lost lining as well as the ala borders. The pictures *B* and *D* were taken four weeks after the operation. The swelling, the lines of union, and the skin grafts on the forehead are still quite evident.

columella of an otherwise normal nose will often facilitate the intake (Fig. 67). A nose, with ample nostrils, that has its tip tilted upward may take in air so freely as to cause excessive drying of the lining. In some instances this can be advantageously lowered with a dorsal insert of cartilage (Fig. 68).

Abnormally large nostrils can be reduced by removing sections through the full thickness of skin, cartilage, and lining. Losses of skin or subcutaneous tissue about the upper part of the bridge can be replaced by a skin covered pedicle flap or a dermal flap from the forehead (Fig. 69).

The over-effort to draw in air through small or obstructed nostrils, more often through nostrils in which the air stream is impeded by an overhanging tip, may cause collapse in the upper part of the ala which further increases the obstruction.

The splinting of the collapsing wall by the intramural implanatation of cartilage shavings has been advocated, but we have confined our efforts to the attempt to do away with the cause of the obstruction.

Postoperative Hemorrhage. It is not practical to tie cut vessels in doing intramural nasal operations; usually pressure for a little while will control

Fig. 61*A*

Fig. 61*B*

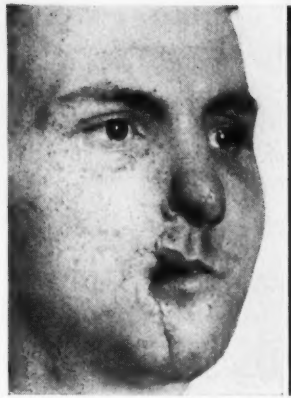


Fig. 62*A*

Fig. 62*B*

Fig. 61.—Soft tissue restoration of columella, tip, and part of lining and covering from forehead flap. In this patient the loss, due to an ulceration, which occurred in the growing period, included the columella, tip of the nose, and the external surface was so shortened that lengthening was also necessary. This was done by a forehead flap that was first let in through a transverse incision below the bony bridge to line the vestibule and form the tip and columella, and at subsequent steps the flap was cut and the pedicle used to lengthen the external surface. This let the uptilted alae drop down to their proper level (see Fig. 51).

Fig. 62.—Soft tissue restoration: ala restored from forehead flap. *A* shows a boy twenty years old, who, from the accidental discharge of a shotgun at rather close range fourteen months previously, lost the midpart of the mandible, most of the right side of the lower lip and chin, quite a bit of the right side of the upper lip and right ala of the nose, the anterior part of the maxilla, and corresponding part of the floor of the nose. While doing other repairs, a flap was raised from the right side of the forehead with its base above the inner end of the left orbit. Six weeks later this was turned down and, with its distal end doubled over itself to make a lower border and lining for the new part of the vestibular wall, this was trimmed and sutured into the defect after the distorting scar from the ala was removed, thus restoring the original size of the defect and allowing the remaining part of the ala and that side of the tip to be brought to their natural positions. At subsequent steps the base was cut across and adjusted, the pedicle uncurled and implanted back on the forehead, and the remaining granulating area covered with a split skin graft. The free border of the new part of the ala was thinned out by an intramural excision. *B* shows his appearance twenty-one and a half months after *A* was taken. During this period, in ten major or minor steps, the mandible was first united in the midline, later cut obliquely in the mental region, spread laterally and again united to restore proper width to the arch, and occlusion to the teeth. The lips were worked toward each other and over to the right. The left cheek was advanced and the upper and lower labial fornices were restored, with split skin grafts implanted upon a wax form.

All of this would fall short of its present appearance and utility were it not for a set of ingenious dentures that was patiently and painstakingly worked out by Dr. J. A. Brown, to whom and to other dentists, we are indebted for the final satisfactory outcome of a great many of our cases.

Though his appearance is no longer conspicuous, patient can masticate, and he appreciates what has been accomplished; in common with a great many others of his kind he is rather insistent on having still further work done.

Outside of the unnecessary depth of the skin scar, we believe that all has been done that good judgment calls for.

Fig. 63*A*

Fig. 63*B*

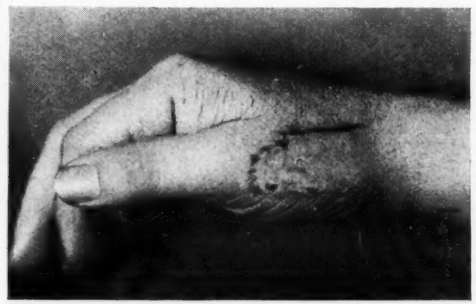
Fig. 64*A*

Fig. 64*B*

Fig. 63.—Soft tissue restoration: partial lining and covering from skin graft and cheek flap. Shows a full thickness loss in the vestibular wall for which the lining was made from a free skin graft that was implanted on the under surface of a cheek flap at the time it was first raised. Later, when the flap was fitted to the external defect, the underlying skin graft was sutured in the lining. Another and possibly simpler plan which we have used is to spread the free skin graft over a tent inserted into the nose at the time the external flap is put in place so that the under surface of the flap is held in firm contact with the raw surface of the graft, but this makes no allowance for the graft where the walls are yielding.

Fig. 64.—Soft tissue excision: restoration with a pedicle flap. In this case infiltrating paraffin had been injected. Removal of all tissue down to bone and cartilage was required. *B* was taken soon after completion of the transfer of the forehead flap. In a few months much of the objectionable thickness will have disappeared.

A



B

C

Fig. 65.—Soft tissue restoration: columella and lining from hand flap. When present, the removal of scar from the lining of the vestibule allows expansion of the tip and gives a base for blood supply to the columella. The columella and this lining part must join each other at right angles, and the under border of the columella and of the tip must make one uninterrupted plane. This requires some ingenuity and often a few more steps than came into the original plan. *B* shows the flap on the outer side of the hand which has been previously raised and sutured in place pending adjustment of blood supply. Flaps taken from either border of the hand or front of wrist are thin, free from hair, and have good blood supply. *C* shows the restoration of not only the columella but of some space on the under surface of the tip.

Fig. 66.—Soft tissue restoration: ala by a hand flap. In this case the covering of the whole side of the face had been destroyed with radium in the treatment of a cutaneous angioma. Most of the restoration, including the side of the nose, was made from a chest flap but the overhang of the ala was still missing, and this latter was obtained from a flap taken from the inner side of the arm.

Fig. 67*A*

Fig. 67*B*

Fig. 68*A*

Fig. 68*B*

Fig. 69*A*

Fig. 69*B*

Fig. 67.—Air friction: the overhanging tip. In the above case the nostrils were large and the vestibule was ample, yet the patient was distinctly conscious of a respiratory effort that was relieved by raising of the tip of the nose. He was referred by a rhinologist to have the condition corrected. This was relieved by removing a wedge-shaped section from just within each vestibule, that included lining and a section of the lower lateral cartilage, and a full thickness wedge from between the columella and the septum. The bases of the wedges removed, all joined each other inside of the tip. Suturing the borders of the defects after undermining the skin of the tip upward gave the result shown in *B*. There is always some tendency for the tip to slump down a little and some overcorrection is advisable.

Fig. 68.—Normal but displeasing. From the history it is probable that the condition shown in *A* was mostly due to previous attempts to correct a fancied deformity. The condition in *B* was obtained by a costal cartilage implant. One does not always obtain quite so pleasing a result. Note that there is a little suggestion of the objectionable rounding of the nasal tip often evidenced after an implantation.

Fig. 69.—Soft tissue repair: repair with dermal flap. This man had suffered a puncture wound of the skull at the base of the nose three years previously, leaving the depression shown. This could have been filled with a bit of cartilage and the skin borders approximated and sutured. It was considered preferable to raise a flap of de-epithelialized derma with its subcutaneous tissue, corresponding in size to the area of the depression and switching it downward on a pedicle attached to the left. The skin and forehead tissue bordering the original defect and also the contiguous defect resulting from the raising of the dermal flap, was undermined and approximated by one continuous suture line with the result shown in *B*.

A *B* *C*

Fig. 70.—External pressure, for splinting and the control of swelling. The simple metal splint, made of thin, easily bent tin, or copper or sheet lead, shown is used frequently for the support of sectioned nasal processes, for support of cartilage transplants, and for application of pressure to the dorsal covering when it has been raised for other procedures. The metal is cut to a standard model and then trimmed for individual use and fitted accurately. The small wing on the forehead holds the splint up. The large wing of the splint applies the pressure and is held in place by gentle tension of the cheeks on the adhesive strip. These may be worn rather comfortably (with frequent changes) for as long as three weeks. For immediate control of postoperative swelling larger wet dressings with marine sponge pressure are used alone or in combination with this type of splint.

There is a tendency for this splint to push on the tip of the nose downward. In cases in which the covering of the nose has been raised from the underlying cartilages or where the cartilages are broken, this tendency might be converted into an actuality. This can be prevented by putting a narrow loop of adhesive plaster from the forehead down, parallel to and in contact with the side of the nose, around the tip and up the other side to the forehead with sufficient tension to hold the tip upward. The splint is applied over this.

bleeding but occasionally in spite of ordinary precautions, the thickness of the wall will balloon up with clot. For this reason cartilage grafts are sutured in place and small drainage tubes are inserted through stab slits in the lining in such a way as not to touch the implants; and external to the dressings a molded thin tin or copper splint is held in contact with the dorsum, with light packing in the vestibule (Fig. 70).

Sutures may be left in place much longer than on any other part of the face, because the nasal skin does not scar easily.

THE PROTECTION FROM CANCER ARISING IN THE LINING OF THE MOUTH OR IN THE REGION OF THE TEETH OR JAWS*

By Joseph Colt Bloodgood, M.D., F.A.C.S., Baltimore, Md.

WOMEN today are demonstrating to men that it is possible to smoke with a minimum risk of cancer. The modern woman keeps her teeth clean and smooth, stops the use of tobacco the moment she feels a sore spot, or sees any place in the lining of the mouth which is different from normal. Women give their dentists a better opportunity to protect them than do men. It makes no difference whether it is vanity or not, women are teaching men preventive medicine.

In past statements based upon studies of cancer and its prevention in the region of the mouth, teeth and jaws, we were more or less forced to begin with cancer of the mucous membrane. Fortunately, education through the press has reduced cancer in this region more than 90 per cent. In the great surgical clinics of the world, up to 1910, the majority of patients who entered the clinics because of trouble in the mouth, had cancer in more than 90 per cent, and hopeless cancer in more than 70 per cent. Today, in those clinics in which advice is sought by individuals properly informed, cancer is found in less than 10 per cent, and as a rule that cancer is early and curable.

At the present time, both the medical and dental professions and the public need not so much information on the precancerous lesions of the lining of the oral cavity, as correct information on the necessity of more frequent x-ray films of the teeth to detect root abscesses, and more careful preliminary investigations and operative preparations, when there is a loose tooth, a painful area in the region of a tooth, an ordinary gumboil, or a swelling in the region of the maxilla or mandible.

The chief cause today, in adults, of any form of rheumatism, especially associated with stiffening of the muscles and joints, which incapacitates for manual labor, is root abscess which can only be detected by an x-ray film and which should be discovered before, and not after, the rheumatism or stiffness of the joints and muscles has developed.

The most common cause of disability among the veterans of the war of 1861 was rheumatism from neglected teeth. It may not be the most common cause today, but it is far too common a cause of preventable diseases.

It is remarkable that the great labor organizations have not recognized the neglect of the teeth as one of the most frequent factors which incapacitate all men and women who must earn their living by the constant and free use of muscles and joints, or who are incapacitated because of a damaged heart from neglected foci of infection, especially in root abscesses.

*Reprinted from *American Medicine*, February, 1932.

XUM

Dentists must decide the age at which it is best, for the protection of the child, to take an x-ray film of the teeth, when nothing wrong is found in the ordinary examination. This film will picture the nonerupted teeth and will allow their removal before, and not after, trouble. Dentists must also advise the public as well as their own patients, how frequently x-ray films should be made of the teeth in adult life, so that root abscesses may be detected before the infection is disseminated.

The dental profession is realizing that its work is extending beyond cleaning teeth, straightening teeth, extracting them, filling cavities, bridge work, and the preparation of plates. In these regions they have become preeminently artists, but today this is not sufficient, because all the benign and malignant tumors of the lining of the mouth and in the region of the teeth and jaws, should come under the observation of the dentist at a time when there are practically no positive signs of malignancy, when the diagnosis is most difficult, and proper treatment yields the most perfect immediate and permanent results.

In the later stages of the benign and malignant tumors of the jaws, the stage easy to recognize, the stage that in the past has been treated by the surgical profession, recognition is much less difficult, but the chances of a cure are reduced tremendously, and as a rule this cure is accomplished only by mutilating operations.

The prevention of and the cure of malignant disease in the mouth and the region of the teeth and jaws, is much more readily possible than either the people or the dental or medical professions realize. It depends upon educating the people to put themselves under the care of a dentist from an early age; it depends upon educating the dental and medical professions that the stage of prevention and cure is the most difficult to detect. In every instance of pain in the region of a tooth or of the jaw, of a loose tooth, of a gumboil, or of a swelling in the region of the jaws, there should be a preliminary study by x-ray plates and films, not only of the region involved, but of the jaws involved, because any of these signs or symptoms just noted may be the beginning of malignant disease. The x-ray will locate the trouble when there is bone formation or bone destruction. This x-ray study will indicate whether a piece should be removed for diagnosis or not, or whether the entire operation should be performed under the guidance and direction of frozen sections made and interpreted by a pathologist during the operation.

Therefore, the oral surgeons of the dental profession should be prepared to do this kind of work in the operating room of a standard hospital where frozen sections and pathologists should be available. Or, dentists and oral surgeons interested in the diagnosis and treatment of this class of oral lesions should get together in a professional building in which there is constantly available a pathologist with a frozen-section apparatus.

Recent studies of benign and malignant lesions of the oral cavity including the teeth and jaws, demonstrate the correctness of these statements and the necessity of the medical and dental professions to be prepared to meet these demands. The enlightened individual educated through the press or otherwise by the medical and dental professions who comes under our observation

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and on our recommendation for a diagnostic survey, or who seeks our advice the moment of the first warning, also on our recommendation, should not find us unprepared to meet the demands of this much more difficult diagnostic and therapeutic problem. On the stage of prevention our motto must be Prevention On the stage of cure there must be no failure.

ABSTRACTS OF
CURRENT LITERATURE

NUTRITION AND PEDIATRICS

By Samuel Adams Cohen, M.D., New York City

It is the purpose of this Journal to review so far as possible the most important literature as it appears in English and foreign periodicals and to present it in abstract form. Authors are requested to send abstracts or reprints of their papers to the publishers.

The Treatment of Anemias. Janet M. Vaughan. Lancet **222**: 565, 1932.

Vaughan holds that in the human individual normal hematopoiesis is dependent upon an adequate supply of (1) iron, (2) copper, (3) at least two substances present in whole liver, (4) vitamin C, (5) some complex of vitamin B, (6) secretion of the thyroid gland. According to Vaughan a relative or absolute insufficiency of one or more of the above mentioned factors will produce anemia.

Iron is an essential constituent of the hemoglobin molecule. A deficient intake of iron appears to play some part in all iron deficiency anemias; although, in some instance, when anemia occurs, it is felt that anemia results because the body's power of absorption and distribution of iron is at fault.

Vaughan states that it is difficult to assess the exact value of copper therapy, since many of the iron preparations contain small amounts of copper as an impurity.

The anemias which respond to treatment of whole liver and iron are called microcytic anemias and have usually a low color index. These anemias are associated with (1) chronic hemorrhage, (2) starvation, (3) deficient dietary in children, (4) past sepsis, and (5) carcinomas.

In selective instances, particularly in adolescence, thyroid deficiency may exert a varying effect on hematopoiesis. These individuals usually have a hypothyroidism associated with low color index and their anemia usually improves with the administration of thyroid.

Lack of vitamin C intake which induces anemia, as for example in scurvy, and also experimental studies in vitamin B deficiency suggest the close association of these vitamins to hematopoiesis.

The author mentions two important factors which hinder blood formation, namely, (a) sepsis, (b) certain toxic substances as benzol, lead, and excessive exposures to radium and x-ray.

Obviously any of the above mentioned therapeutic agents are rendered ineffective when these harmful influences on blood formation are present.

Water and Health. Editorial, J. A. M. A. **93**: 8, 1932.

In an editorial on "Water and Health" the Journal of the American Medical Association makes some practical comments on E. F. Du Bois' "Diet and Disease."

It is not generally known, for instance, that water constitutes more than 70 per cent of protoplasm, the structural basis of organic life, or that, for example, water constitutes the medium in which the chemical changes of metabolism occurs. The relative output of water by the various channels: kidneys, bowels, lung, skin and saliva, differs widely in different persons and also in the same persons under like conditions. One of the results sometimes of an undue intake of fluid is that it is followed by a compensatory output.

Augmented heat production in the body as a result of exercise or fever calls for an increased amount of water to facilitate the dissipation of heat, so that the normal temperature of the body will be conserved.

It should be borne in mind that food contains a considerable amount of water; for example, nine-tenths of many fruits and vegetables consist of water and comparatively few foodstuffs contain less than half their weight in water. In addition to this intake of water through the ingestion of solid foodstuffs, the fluid supply of the body is also increased by the fact that the transformation of foodstuffs in metabolism leads to production of considerable amount of water from the oxidation of hydrogen. In this respect it may be stated that "sugar produces half its weight of water."

Atwater and Benedict found variations in consumptions of water ranging from an average of 2,290 c.c. for persons in repose to 3,700 c.c. for those at moderate work. Because of the demands of the body for water, which as pointed out above is contained in considerable quantities in solid food, Du Bois states that if for any reason solid foods are cut off in disease, it is necessary to supply a proportional increase in liquids in order to bring the water intake up to the level of that of an ordinary person in health. Moreover, in acute disease a still further increase of water intake should be made in order to compensate for the excessive loss of water by the way of the skin and the lungs.

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FORUM

To the Editor:

The INTERNATIONAL JOURNAL OF ORTHDONTIA, ORAL SURGERY AND RADIOGRAPHY has long been a most ably conducted scientific publication, and has served well the needs of the specialty in that respect. I have long felt, however, that it would be greatly humanized by the inclusion of a department devoted to correspondence and the discussion of the problems of the average practitioner.

In the more or less remote past, I recall that it was held in some quarters that orthodontists were largely a lot of parasites upon the rich, and there were no followers of this specialty outside the larger cities where wealth and culture congregate. The last decade has brought a great change in the relation of dentists and the public toward each other, and what with the A.D.A. now fostering certain publicity calculated further to educate the public to the value of dentistry as a health conserver, and especially the increased interest in the care of the teeth of children, we are called upon to extend our services to include the children of the masses. Indeed, if our service really is a health proposition, *we have an obligation to render service to as many as possible* who stand in need of it.

For whatever reason, it is quite evident that the number of dentists specializing in orthodontia has been rapidly increasing in the last ten or fifteen years, and sometimes one sees indications that men are entering the specialty who are not as brilliant as those who in the earlier years did so much to develop it on a firm and scientific basis. There also always were and probably always will be many men in the smaller cities and towns who are obliged to attempt the treatment of malocclusion in their general practices.

It seems logical to assume then, that there are many who would be benefited if there were some source of information to which their problems might be taken, and where help might be sought. Such a forum conducted in the Journal would not, of course be expected to take the place of postgraduate training, but would nevertheless be found useful even by those who have had the benefit of such training, and many years of experience.

The precedent has already been established by such publications as the *Journal of the American Medical Association, Dental Items of Interest, Oral Hygiene* and others.

It is perhaps a remarkable coincidence that only yesterday, after I had decided to write this letter, a case presented for consultation involving a question that in my dozen years of exclusive practice has never before come up, nor have I ever found anything in the literature pertaining to it.

The patient, a boy of eleven years, presented with these conditions: a supernumerary maxillary right central incisor, and on the left an incisor that is about one third larger in all dimensions than normal.

The two incisors on the right are normal in size, and the supernumerary would require very little grinding to make it look very well as a left central. The logical thing to do would be to extract the oversized left central and move the supernumerary right over into the space thus created. But the question arises—can one successfully move a tooth across the suture from the right premaxilla to the left? I should like to have an expression of opinion from others before attempting the correction of this case.

Yours very truly,
L. H. WIRT.

To the Editor:

I am writing to you as editor of THE INTERNATIONAL JOURNAL OF ORTHODONTIA, ORAL SURGERY AND RADIOGRAPHY, since you possibly will be in a better position than any one in our specialty of orthodontics to answer a problem that has long been on my mind. Presumably a man entering the field of orthodontia as a specialty is one of high ideals and one who has of necessity attained some degree of proficiency in the practice of general dentistry. It is a conceded fact that this proficiency is best obtained through the formation of study clubs directed by an outstanding man in the community. This applies to the study of gold foil, inlays, oral surgery or any of the other allied branches of dentistry. Another conceded fact is that ever so much more benefit is derived from watching a man operate, whether it be the placing of a gold foil filling or the extracting of an impacted third molar or the making of an orthodontic appliance, than can be had from hearing a paper on the subject read by the same man or from reading in any of the various journals.

We may admit that the courses pertaining to orthodontics which are offered to the undergraduate in our universities are not all that may be desired, nor do the courses which are offered by our universities and private schools for graduate students desiring to specialize in orthodontia produce thoroughly competent orthodontists. Nevertheless we are here, and there will be probably hundreds more following us. The question of how to make these young men specializing in orthodontia more proficient and more qualified will always confront our profession, and the ambitious young orthodontist will always be striving for that knowledge. The problem then resolves itself into where will he find this and how shall he receive it.

Our universities now offer postgraduate courses covering possibly from one to twelve months; but for the man who has already established a practice, it is practically out of the question for him to be away that length of time. Where else may he obtain the training?

If he has entrée to the office of one of our recognized leaders, he is indeed fortunate; for that is an ideal situation, but to the very large majority it is impracticable. He can and by all means should attend the meetings of the American Society of Orthodontists and its component societies, where a great amount of knowledge may be obtained. But that is not enough, for there he simply hears papers read and sees appliances that have already been constructed.

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If we look to the universities and the private schools to develop the man desiring to specialize in orthodontia by giving him only a good foundation, it seems to me that the American Society of Orthodontists might be overlooking an opportunity to serve the coming group of young men now members and who will in a few years be expected to carry on in the places now filled by the recognized leaders. If these who are now the leaders really wish to improve and advance our specialty of orthodontia, and I believe that they do, the answer to the problem lies within the American Society of Orthodontists. There are possibly many solutions to this problem, one of which may be the supplementing of the annual meeting of the American Society of Orthodontists with one conducted by a group of outstanding members. These meetings may be held wherever convenient to the men directing the clinics and could consist of papers and also could utilize a laboratory, and appliances may be made under the direction of these men. Here it is that cases and individual problems could be discussed, with an untold amount of good derived. The expense of such a meeting would naturally be defrayed by the men in attendance. Whether or not such a plan is feasible is certainly not of the most importance, but the fact remains that within the American Society of Orthodontists there is a wonderful opportunity toward solving the ever present problem of how the younger man shall be better qualified truly to represent the specialty of orthodontia.

Sincerely,

E. Allen Bishop.

The International Journal of Orthodontia, Oral Surgery and Radiography will be glad to consider for publication further communications from its interested readers in regard to the above subject. In at least one state in the United States of America, a law has been recently placed on the statute books which according to the statements of the sponsors of this law, it is maintained the law is necessary to protect the public in the orthodontic service for its citizens. If there is legitimate basis for this assumption that it is important that the public be protected from untrained orthodontic service, then this subject is at least timely and of considerable interest to orthodontists.

Editor.

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EDITORIALS

Children's Dentistry and Schools

CHILDREN'S dentistry in conjunction with child welfare activities is attracting attention and is becoming more important both in the eyes of the laymen and in the eyes of the dental profession. THE INTERNATIONAL JOURNAL OF ORTHODONTIA, ORAL SURGERY AND RADIOGRAPHY is receiving numerous communications urging it to devote more space to the subject of children's dentistry, many of these writers pointing out the close "tie-in" which exists between children's dentistry and the modern practice of orthodontia and the prevention of malocclusion of the teeth. Much of the material and many of the manuscripts presented by authors on the subject of children's teeth sooner or later in the body of the text present either a vigorous indictment or ridicule directed toward the dental profession at large for its indifference and neglect of children's dentistry, as a department of practice.

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If a layman would thumb the usual manuscript upon the subject of children's dentistry as these papers come and go, he would get the impression from it that dentists as a whole are to carry the entire burden of society's scorn as a result of the general neglect of children's dentistry. There are some other reasons, however, responsible for the prevalence of this so-called neglect and indifference, and it is surely time the dental profession rises up in arms and refuses to have the blame passed consistently and entirely to its shoulders.

Dr. Wm. C. Fisher of New York calls attention to angles of this situation* which interest orthodontists as well as general practitioners because they, too, have a common problem. To quote from Dr. Fisher's paper:

"If, during the preschool age which is, as we know, a very important period, we could persuade ourselves to render the services necessary, we should probably have much less work to do in the early school years. For here, during the early school years, we are confronted with the problem as to how the child in private practice may receive as efficient attention as the poorer child in the public clinic. It is the question of 'time out of school hours.' In those institutions where there is school dentistry, the child may have the necessary attention during school hours without any recorded loss of attendance, but if the parent desires the child to go to the family dentist, we are immediately confronted with opposition from the school authorities, the teacher, the principal and the superintendent. The parent is told that the necessary dentistry must be performed after school hours or on Saturdays; in other words, the child in the 'private practice' family is punished by being made to give up its day of play, while the poor child or the clinic child has the time free for recreation. If in order to save its only day of play in the week, the child is forced to go to the dentist after school hours, we are confronted with a condition that is equally responsible for the unsatisfactory situation existing today; namely, that dentists in the better class of practice do not desire children as patients, and are not able, even if willing, to give the best of services. What child after a long day in the classroom is in the nervous or physical condition to endure a half hour or an hour's session with the dentist? What dentist, after a full day of tedious office hours, is himself in as fine a condition to handle the most difficult of all of his clientele; namely, the nervous child, the tired child, the unwilling child. If the child is compelled to come in on Saturday, giving up its play, it frequently comes in a spirit of antagonism. This in itself is a handicap which the most expert specialists in this line of work find it frequently difficult to overcome entirely.

"For the past eight or ten years, the dentists of the Pacific Coast interested in the dental problems of children have waged a vigorous campaign against the school authorities, endeavoring to do so in a most constructive and friendly manner. James D. McCoy has been one of the most able leaders in this campaign, and his pen, as in the saying of old, has been 'mightier than the sword.' The editor of the *Pacific Dental Gazette* has been one of his most able allies. They did not hesitate to publish or broadcast conditions which were affecting the health of the children of today, the citizens of tomorrow. They pointed

*Taken from "Seventy-seven Years Ago: An Indictment of the Dental Profession," Journal of the American Dental Association, December, 1931.

out that the children of school age were not being afforded the opportunity to have their dental defects remedied without unnecessary delay, and it seemed inconceivable and indeed beyond reasonable justification that the school authorities were not giving this work their whole-hearted support. With that and similar unanswerable arguments, which it is unnecessary to detail at this time, the school authorities had to make concessions. Had they not done so, they would have had to admit, at the same moment, that they were incapable of the care of these children during the greater part of their young lives.

"Dentists everywhere have been and still are confronted with the same problem, the same difficulties, namely, the lack of cooperation of school authorities. Why the children of taxpayers, the children of parents able and willing to provide the services of private practitioners should be denied the opportunities for this necessary work as are accorded to the children of the poor and the children of the public clinics is beyond comprehension. You may say that it is a far more difficult problem in the large cities, governing concessions made to a half million school children. I contend it is no more a problem than it is for a community in which there may be enrolled only a few hundred children. It can be solved in our smallest or our largest cities just as it was solved in the city of Los Angeles. All that each community needs is one or two able, but sincere crusaders, like Dr. McCoy and Dr. Endelman. I am convinced that the school authorities in practically every community can very soon be shown the necessity for hearty cooperation in this campaign toward the conservation of the health of the children."

Dr. Fisher's points are important, well-timed and appropriate to orthodontists as well as to dentists. Just so long as mothers bring their children to the dentist and the orthodontist and admonish him that the work upon their children must necessarily be done on Saturday morning and Saturday morning only, because the school authorities will not permit the child to come for treatment at any other time, just that long will the average busy dentist (he being of course only human) feel that the responsibility of the child's mouth is not his alone, just that long will he feel that modern pedagogy has become so inconsistent and top-heavy that it is doomed for a toboggan in the normal scheme of things. Whenever school interferes in the slightest with the physical welfare and the nutrition of the child, by circumscribing about its life certain arbitrary restrictions which automatically interfere with the rational treatment of the physician or dentist, then it is time to do something about it, and one of the best things to do about it is for physicians and dentists everywhere to insist that if they are to treat the child, treatment must come ahead of arbitrary and dogmatic school rules and regulations; in other words the child must come for treatment when wanted, school and school rulings notwithstanding.

While we are denouncing the dental profession for its gross indifference to children's dentistry, let us stop and reflect that modern pedagogic child militarism is in many instances making it a positive burden for professional men to give the children in their practices the careful, painstaking, detailed and precisive treatment to which they are justly entitled.

H. C. P.

XUM

The Answer

UPON the solicitation and invitation of the St. Louis Dental Society, the president of the American Dental Association appeared upon the program of the Society the evening of January 11, 1932, and outlined the plans for public dental education adopted by the American Dental Association at the Memphis meeting. Doctor Dewey definitely and concisely presented the plans as they had progressed up to that time. The stenotyped copy of the president's talk with the discussion which followed was subsequently published in *Oral Hygiene* in the April issue.

Since the St. Louis Dental Society was fortunate enough to have this matter outlined directly by the president of the American Dental Association, since the plan was discussed upon the express invitation of the society, and possibly since the St. Louis Dental Society is one of the oldest dental societies in America, this meeting and its resulting reactions have attracted a great deal of attention throughout the country.

Subsequent to Doctor Dewey's address, the president of the St. Louis Dental Society appointed a committee of eight to act as Committee on Public Dental Education to investigate, to discuss and to report at a later meeting of the Society its recommendations upon the subject of public dental education and its answer to the plan of the American Dental Association. A special meeting was then called to consider this matter. The committee made its report and exhibited an astonishing amount of information and survey material which it had accumulated as a result of its investigation. The St. Louis Dental Society then, on Tuesday, March 28, gave its answer to the plan for proposed newspaper advertising by local dental societies which had been adopted in principle by the House of Delegates of the American Dental Association at the Memphis meeting, and later by the Board of Trustees. The answer was expressed in the following resolutions:

WHEREAS, the attention of the St. Louis Dental Society has been called to the publicity material, or advertising copy, approved and recommended by the Dental Education Publicity Committee of the American Dental Association, and

WHEREAS, this publicity material, or advertising copy because it implies an attempt by organized dentistry to create markets for its service, can be judged to be advertising rather than educational material, and

WHEREAS, the use of such advertising, or publicity copy, is in direct violation of the Code of Ethics of the American Dental Association and the features implied therein, and

WHEREAS, the use of such copy may bring charges of unprofessional conduct against the profession by layman and allied professional groups, and occasion a loss of dignity, prestige and confidence, and cause the public to interpret all true altruistic motives and actions of the profession as being tainted with a suspicion of commercialism, therefore,

CONGRATULATIONS,

AMERICAN DENTAL ASSOCIATION

A Pioneer of Modern Dentistry welcomes the acceptance by America's leading dentists of the principles for which he has fought for years . . .

DR. PAINLESS PARKER
Founder of the
E. R. PARKER SYSTEM

WE ALL like having the ideas and ideals in which we profoundly believe receive the seal of approval of time and of science. For forty years I have been devoting my time and energy to two things:

FIRST—The education of the public as to the importance of proper care of the teeth . . . and

SECOND—The use of advertising to make dental education available to the greatest number of people, and to make possible high-grade dentistry at moderate cost.

Reprinted from
TIME of Nov. 2, 1931

Advertising Dentists

The American Dental Association, convening at Memphis last week, agreed with Dr. John T. Hanks of Manhattan that "if the dentists do not educate the American people along proper diet and care of the teeth, who will?" Thereupon the Association decided that they ought to hire an advertising agency, and instructed the board of trustees to figure the cost (probably $500,000) of advertising dental health in national magazines and on the radio. Newspapers will get advertising from local dental societies. There are, Dr. John F. Hawks of Manhattan estimated, 36,000,000 people in the U. S. who take no care of their teeth at all, need immediate dental persuasion. President Hoover sent a telegram approving the idea.

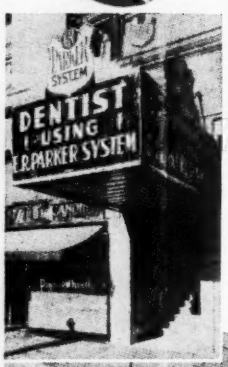
Starting out alone, then gradually surrounding myself with other dentists whom I taught the E. R. Parker System, I have been driving home the application of modern methods to dental practice and dental education.

Perhaps in this I have been years ahead of the times. Similarly, when I pioneered and advocated the use of local anaesthesia and demonstrated painless dentistry as a fact and not a theory, I was frowned down and ridiculed. Yet relief from pain is now becoming universal practice.

Criticism has never offended me because my experience proved that I was right and that sooner or later the dental profession, as well as the public, would recognize this fact.

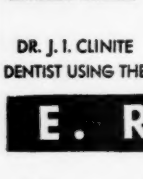
And so it is most gratifying to learn that now, not one man, but thousands of members of the American Dental Association—many of whom have disagreed with me in the past and have even accused me of being unethical—now propose to advance their profession and to benefit the public by working aggressively with these same "tools."

With this worthy program of the American Dental Association in effect, I shall feel fully repaid for the years of pioneering work I have done, and have been glad to do.



New, Modern Dental Offices Open

Entrance and a corner of the Reception Room of the new offices at 1028 Market Street



DR. J. I. CLINITE
DENTIST USING THE

This action happily comes at the time of a most important event in the history of the E. R. Parker System. I refer to the opening of the new dental offices at 1028 Market Street, San Francisco, one of the most modern dental offices in the whole world.

You are cordially invited

Whether or not you need dental advice or dental work, you are cordially invited to visit these new offices. I want not alone all San Franciscans, but the wide World, to realize the completeness of the service and equipment available through dentists using the E. R. Parker System and if you will send in your name and address, a postal card will do, you will be sent a card entitling you to $2.00 worth of dental work FREE.

Highest type of brains and skill

The dentists using the E. R. Parker System have always represented the highest type of brains and skill in their profession. They are ethical dentists fully equipped by training and experience to do the most delicate and artistic dental work.

Free examination and advice

Should you desire a consultation and examination it will be cheerfully given—the best dental advice it is possible to obtain—and entirely without charge.

And of utmost importance

All dentists using the E. R. Parker System are distinguished by another important feature. Their dental work—the highest type it is possible to secure—is placed within the means of the average person. Dental Service is kept up to the HIGHEST possible point and fees are kept down to the LOWEST possible point.

(Signed)

Painless Parker

E. R. PARKER SYSTEM

E R PARKER SYSTEM

Be it resolved, That the St. Louis Dental Society, a component of the Missouri State Dental Association, which is a component of the American Dental Association, hereby emphatically voices its condemnation of the dissemination of such advertising or publicity material, as organized by advertising agencies and approved by the Dental Educational Publicity Committee of the American Dental Association for use in the public press, and

Be it further resolved, That the Dental Educational Publicity Committee be requested to refrain from the promotion of plans calling for the publication of paid advertising publicity or educational material, and that its program be altered to the end that the copy offered for the public may be enlightening on matters of dental health in a way, dignified and educational, and free from all features which may bring discredit or charges of unethical practice, to the profession as a whole or to its organizations, and

Be it further resolved, That Dr. G. B. Winter, our representative on the Board of Trustees, be instructed to bring before the Trustees the action and attitude of our society, on the matter of paid display advertising, and that he be instructed to use his influence to change the present methods, to meet our approval, and

Be it further resolved, That we herewith instruct those of our members who will serve in the House of Delegates of the American Dental Association, at Buffalo, to bring to the attention of the House of Delegates, the action of this society, and to do all in their power to force a discontinuance of said activity, and

Be it further resolved, That a special committee be appointed to cooperate with similar committees of other societies to take steps to bring about a discontinuance of this matter, or to proceed to organize such committee activities for the purpose outlined above.

COMMITTEE ON PUBLIC DENTAL EDUCATION
OF THE ST. LOUIS DENTAL SOCIETY

THE INTERNATIONAL JOURNAL OF ORTHODONTIA, ORAL SURGERY AND RADIOGRAPHY expressed itself editorially upon this question of newspaper advertising in the March issue, and asked the question, "Has It T. N. T. in It?" This advertising proposition is no doubt the most important issue the dental profession has been called upon to meet in many years, and we believe that the adoption of this policy is dangerous and not to the best interests of the American Dental Association.

Accompanying this editorial is a photostatic copy of an advertisement of the Parker System which was printed in the *San Francisco News* on Friday, November 27, 1931. The lesson to be gleaned from this advertisement needs no editorial comment; it is obvious to every man practicing and interested in ethical dentistry. This advertisement in the face of the present developing conditions will interest the ethical dentist just as Aesop's Fables interest the intelligent child. The American Dental Association by approving newspaper advertising is leaving wide-open a vulnerable spot which may in time entirely change the character of dentistry as a profession and turn it purely and simply into a business.

H. C. P.

The Forum

IN DISCUSSING the various and sundry departments of dentistry in "The Best Prophet of the Future Is the Past," John D. Williams, Ph.G., D.D.S., in a recent issue of *Oral Hygiene* makes the following very interesting statements in regard to the subject of orthodontia as an activity, a department of the practice of dentistry:

"Orthodontia like other branches of dentistry is not satisfied to stand still. The result is that new methods of practice are constantly arising to improve treatment and to create controversy. At present the followers of this specialty are enjoying a difference of opinion as to the proper age of a patient for beginning treatment. One group advises the application of regulating appliances upon the deciduous teeth at a very early age, on the principle that an abnormal condition should be treated as soon as it is discovered. The other group advocates postponing the use of appliances until the natural forces of Nature have been given every opportunity to correct the defects.

"This latter group points out that a dentist often waits for Nature to sequestrate a piece of diseased bone and a surgeon waits for the acute symptoms of cholecystitis to subside before performing an operation. During the next ten years the orthodontists will have settled this question. As the x-ray becomes more popular they also will agree upon the proper age at which treatment should be started."

It is to be noted that in the above quotation the author points out that the followers of this specialty are enjoying a difference of opinion and that he divides the followers of the two varied schools of thought into two groups. It seems to have become customary, particularly among writers referring to orthodontics, to classify or group in some manner the workers in this field.

There is another man quite eminent in the dental profession who has seen fit, facetiously at least, to divide orthodontists into two groups from an entirely different basic viewpoint. Dr. Clarence O. Simpson, the radiodontist, ten years ago wrote that orthodontists, in his judgment, at least, are divided into two groups, namely, the "quick and the dead." He points out that the quick advocate the correction of malocclusion in a very few months and trust in the Lord that their work will remain (like a used car) *as is*. Then he says there are the dead who treat malocclusion indefinitely, sometimes into that declining period of life known as ripe old age. To the casual outside observer, he points out, the conclusion naturally arises that both groups cannot be right, yet how is he to know which group to follow. Other writers have referred to still other groups, one which adheres to the procedure of tipping teeth in their treatment, and another, just as enthusiastic a group, which adheres to bodily movement.

Realizing that there is an honest and conscientious diversion of viewpoint upon many questions pertaining to the practice of orthodontia, and that the quickest and shortest route to the reconciliation of viewpoint is secured through

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open, frank and free discussion, the editors of the INTERNATIONAL JOURNAL OF ORTHODONTIA, ORAL SURGERY, AND RADIOGRAPHY have decided to establish a department called "The Forum" which will be devoted to the frank but impersonal discussion of various topics pertaining to questions of orthodontia, oral surgery, and radiography. Subscribers to the Journal are invited to express their opinions within these columns, frankly and openly to discuss perplexing problems. Subscribers will be asked to be entirely impersonal in these discussions and to approach a subject entirely from the broad perspective of scientific right or wrong, keeping in mind that the individual viewpoint is usually not of so much consequence as are group viewpoints. It is true that orthodontia as a science is in its infancy and it is believed that the Forum will be of interest to the subscribers to reconcile the viewpoints on many subjects. It is to be remembered that honest difference of opinion is wholesome and interesting, and has been responsible not only for many horse races but for international debate. Older orthodontists will recall a time when the question of extraction of sound teeth in children's mouths for the correction of malocclusion was debated by the leading orthodontists; they also can recall that from these debates, which at times were quite hectic, emerged a concurrence of opinion as to the imprudence of this practice. This indicates that in the expression of opinion progress often emerges.

IN MEMORIAM

JAMES LEON WILLIAMS, D.D.S.

James Leon Williams was born in Maine on April 21, 1852. He was there ushered into membership in a family already famous for its crusading spirit in the rights and advancement of man. Perhaps the first famous member of the family was Oliver Cromwell, who was born a Williams. Roger Williams, who founded Providence Plantations, Captain Samuel Williams, who fell at Lexington, and William Williams, a signer of the Declaration of Independence, were others. The little lad born on the Maine farm inherited a large measure of their spirit.

In 1871, at the age of nineteen, Leon Williams, as he was generally called, was launched into the practice of dentistry at North Vassalboro, Maine, under the tutorship of a dentist of very high standing in the local profession, Dr. Roberts. Here, a year later, he married, and of this union four sons were born.

Shortly after his apprenticeship began, Dr. Williams joined the Maine Dental Society, of which, as he was only about twenty years old, he was probably the youngest member. Almost immediately his bent toward progress became apparent. He borrowed the microscope which belonged to the society, kept it most of the time for two or three years, mastered a technic by studying advertisements and by correspondence and, working with homemade apparatus which would now be considered very crude, began those studies which were to do so much to set the histology and pathology of enamel on a secure foundation. In May, 1882, he contributed to *The Dental Cosmos* an article entitled "Studies in the Histogenesis of the Teeth and Contiguous Parts," which brought on an active battle with the supporters of the current ideas of histology. Later Dr. Williams, but little known, met Dr. Garretson, then the leader for the old ideas and a most effective speaker, on the platform, and successfully upheld the new theories.

His studies into the histology and pathology of enamel were continued for more than fifty years and provided a wealth of information. Many of the specimens which Dr. Williams prepared with his own hands and photographs of them which he made have never been excelled. In this field of science Dr. Williams won world-wide fame.

Perhaps Dr. Williams is better known to many of the younger members of the dental profession for his contribution to the advancement of prosthetic dentistry than for his work in histology and pathology. In 1887 Dr. Williams settled in London, England, seeking to benefit a threatening pulmonary trouble, and his health improved. In his practice in London he constructed many prosthetic restorations. He early became dissatisfied with the esthetic qualities of the artificial teeth then available and in 1905 made a strong appeal to manufacturers for better teeth. Since the dental profession in general showed no interest in improved teeth, the manufacturers turned a deaf ear to his plea.

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In 1907 Dr. Williams set himself to arouse the dentists of the world by a series of articles in *The Dental Items of Interest,* with strong editorial support by Dr. Ottolengui. As a result of the joint effort, two-tenths of 1 per cent of the dentists whom the magazine reached showed enough interest to write a letter approving the effort. After Williams and Ottolengui ceased their appeal, no one showed the slightest interest. But Dr. Williams, determined that his own vision and faith should become the vision and faith of his confreres, returned to America in June, 1910, and in July presented a powerful appeal before the National Dental Association.

As a result of the response which he was able to secure, he enlisted the support of a manufacturer in the carrying out of his plans. Funds and associates were provided, and a campaign of unflagging effort was begun. In November, 1911, Dr. Williams made a discovery which, when put into practical form in 1914, separated all denture work performed before that time and without benefit of the discovery from all denture work done after that date and with the benefit of the discovery. He discovered that three typal forms of maxillary incisor teeth have been common to all races of men of whom we have even a reasonable record in the form of skulls containing anterior teeth, and that in living persons the effect is most pleasing when the form of teeth is like the outline form of the face, seen full front in repose. Dr. Williams gave his discovery practical value by producing artificial teeth in the typal forms and in blended forms. His principles and his tooth forms are now standard the world around.

Dr. Williams' mind was too active and versatile to be satisfied with studies in histology and prosthetic dentistry. He became an earnest student and an interesting lecturer and writer on the progress of man from his early beginnings down to the present. During one period of enforced idleness he made himself so successful as a landscape artist that he might have been famous in that line if he had cared to follow it.

A few years ago Dr. Williams purchased the farm on which he was born, and which was rich in memories of his parents and his boyhood. Here he built a beautiful home and spent his summers. His winters were passed in New York.

While Dr. Williams had failed physically during the last four or five years, his mind had shown no signs of change, and his interest and awareness had always been greater than his strength. He died of heart failure, February 23, 1932. He is survived by Mrs. Williams and two sons, Harry Williams and Percy Norman Williams, D.D.S.

Dr. Williams was one of the race of giants who hewed out the foundations of dentistry as a profession. Differing often among themselves, battling violently with imperfect knowledge and for objectives not clearly seen, they nevertheless carried the whole profession forward with them. He did a work which will benefit many who never knew him, and which will become more and more effective as dentistry progresses.

NEWS AND NOTES

The American Society of Orthodontists

Thirty-First Annual Meeting

The program for the Thirty-First Annual Meeting is taking shape very rapidly under the guidance of Dr. J. D. McCoy and the other members of the Board of Censors. In this issue you will find the program as it stands at the present time with other subjects to be announced later.

As this meeting is being held in Canada, there are a few regulations which the men attending will have to observe when taking clinics into Canada. The Collector of National Revenue in Toronto is being advised that the records and documents necessary for the conducting of the meeting may be permitted free entry. If you are contemplating taking a clinic to the meeting, it would be advisable to write the Secretary for a program, which may be used to identify your attending the meeting.

The chairman of Local Arrangements in Toronto, for the convenience of members and others who plan to attend the meeting, has appointed district captains so that groups may be formed and make the trip more pleasant. If you wish, get in touch with one of the captains for further information. The following cities and men are appointed to carry on this plan.

Montreal, Canada, Dr. Gerald Franklin, Medico-Dental Building.
St. Louis, Mo., Dr. Leo M. Shanley, 4482 Washington Blvd.
Kansas City, Mo., Dr. A. H. Allshouse, Jr., 6247 Brookside Blvd.
New York, N. Y., Dr. L. J. Porter, 730 Fifth Ave.
Boston, Mass., Dr. F. A. Delabarre, 520 Beacon St.
Detroit, Mich., Dr. O. W. White, 407 Fine Arts Building.
Chicago, Ill., Dr. Fred E. Haberle, 55 East Washington St.
Baltimore, Md., Dr. Harry E. Kelsey, 833 Park Ave.
Philadelphia, Pa., Dr. John W. Ross, 1520 Spruce St.

It is important that you take a program from this country, as the customs will permit the Secretary to take only a few across the border. So if any nonmembers desire a program, we shall be glad to mail you one upon request.

CLAUDE R. WOOD, Secy.-Treas.,
Medical Arts Bldg.,
Knoxville, Tenn.

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A Pullman Trip Abroad

Beauty and Novelty for American Visitor to Canada's Queen City—Toronto

Just overnight from every one of the principal cities of eastern and central United States lies Toronto, Canada, which its own people love to call the "Queen City," a focal point of interest for American visitors because of the ease of getting there. For 55,000,000 people in the United States, Toronto is less than 500 miles away and offers the novelty of a trip to a land that flies a different flag, at no greater expense or effort than an overnight

The Royal York Hotel which will be the headquarters for the convention.

railroad trip or a day's fine driving. The Province of Ontario, of which Toronto is the capital, has a magnificent highway system, and from every point of entry from the United States unrivalled, fully paved and policed roads lead to Toronto. In fact the drive from Buffalo or Niagara Falls to Toronto is generally admitted one of the most interesting on the continent. It lies through 85 miles of vineyards and orchards.

Toronto has often been called the largest American city outside the United States. This is because it is just enough like one of our own cities for American visitors to feel quite at home, and yet is just different enough in its accent and atmosphere to have a decided charm of novelty.

Many beautiful buildings and tree-lined streets outside the business districts make Toronto a city of unusual attraction. With 850,000 population it has 76 parks and 58 play-

Lagoon on Ward's Island.

Air view of portion of downtown Toronto. (Copyright, 1932, Toronto Convention and Tourist Association.)

grounds; among the former are the Toronto Islands, which form one of the largest municipally owned recreation grounds in the world. These islands lie a mile south of the city and are served by ferries. They afford playing fields for all kinds of games, miles of bathing beaches, lagoons for boating and canoeing, and they shut in Toronto Bay which in summer is never without its dots of white sails. Toronto is a great sailing city. Its Royal Canadian Yacht Club has the largest membership of any fresh water yacht club and maintains a magnificent house and grounds on one of the islands. This year for the first time, a palatial, high-speed motor boat sight-seeing service is to be operated through this interesting section.

Municipal ownership does not stop at parks in Toronto. The city through two commissions owns and operates its lighting system and its street railway and motor coach lines. The result is worth a visit to see. Toronto is unquestionably the best lighted city

The entrance to the Electrical and Engineering Building at the Canadian National Exhibition Grounds.

on the continent, and its transportation system impresses the visitor as combining excellent service with an exceptional amount of cleanliness and courtesy.

Another novelty at which the American visitor is inclined to have a smile is found in the helmeted policemen, but the smile changes to wonder and admiration when these men, mostly with a broad English accent, reply to questions and explain traffic rules as if they had all the time in the world and the visitor was the most important person they were ever going to meet.

Sunnyside is one of Toronto's proudest possessions, and the Torontonian does not hesitate to tell you all about it. Here, along the shore of Lake Ontario, they have created with sand from the bed of the lake itself, a water-front boulevard second only to the harbor drive of Rio de Janeiro, Brazil. Beach, boardwalk, driveways, parkways, bridlepath and lawns, combine in miles of beauty. The cityward end of this development has a group of amusement features of the better type, blazing with lights and gay with music. A fine big bathing pavilion is operated in conjunction with a huge heated and chlorinated swimming pool. In Toronto they will tell you it is the biggest outdoor thing of its kind in the world, and nobody has yet hunted up anything to gainsay their claims. There are special parks and

pools for the children, pony ride, boating and lots of music to make this city-operated outfit one of which any city would be happy to boast.

To the visitor arriving by motor from Niagara Falls or Detroit, Sunnyside is the front door at which Toronto welcomes him, and his first impression is sure to be the miraculous cleanliness of the parkways and roads. His next is likely to be that he has certainly struck a new country for there are men and boys cheering at whippet races. (No, not cars, dogs!)

Government House.

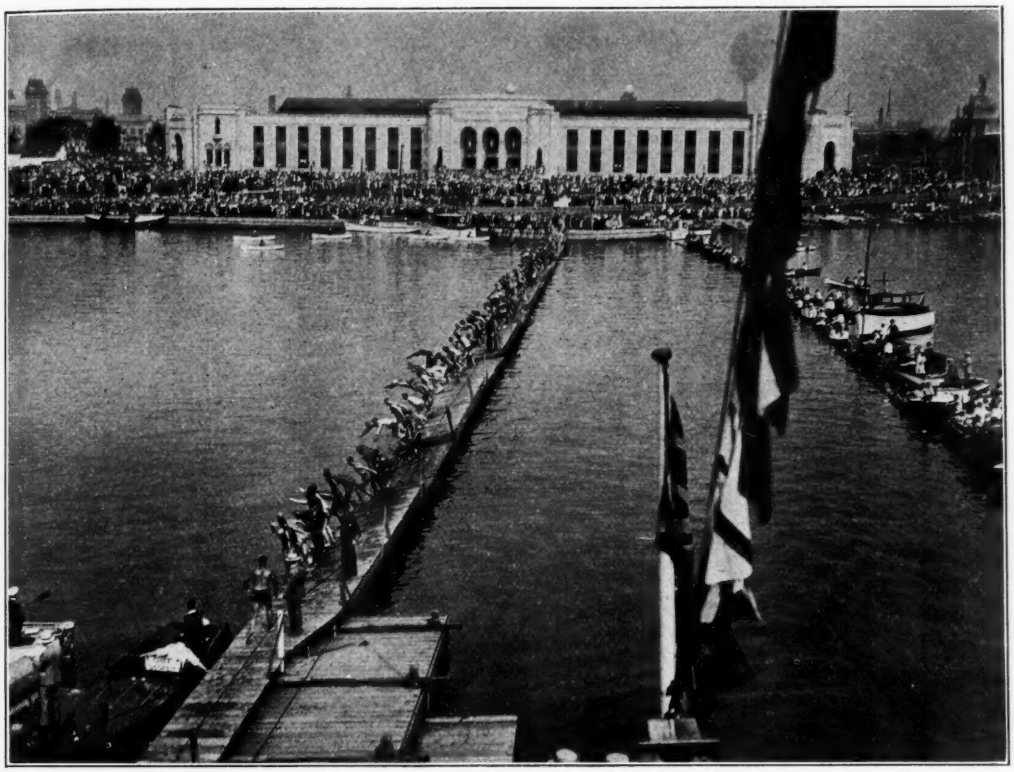
Trinity College, University of Toronto.

It will be at least an hour before the ladies pry him away, and they make their way along the front of the Canadian National Exhibition Park.

It is into the three hundred and eighty acres of this park with its one hundred buildings, that Toronto turns roaring Lions, rolling Rotarians, and Ki-ing Kiwanians, when they arrive in lots of from 5,000 upward. Each year this park and its fine buildings take care of the Canadian National Exhibition, which has grown up to be the largest annual fair in the world. It had over 2,700,000 paid admissions last year. Here, there is every facility for both work and play on the part of big convention gatherings. The Royal Coliseum seats

12,000 and has a lot of room for shows and smaller meetings besides. Toronto's Exhibition Park is a civic park and is kept in the very pink of condition all the time. Its roads are all paved, and its floral displays are among the finest. Big conventions that have marching and drilling competitions use the half-mile-long green oval in front of the main grandstand which seats 8,000 people.

As the center of central Canada's business life, and as the gateway to the vastly rich mining country of northern Ontario, Toronto has a fine business section. The relics of its colonial days are still to be seen in some narrow streets and some buildings that date back to the days when it was called "Muddy York"; but beside these stand office buildings running up to twenty-five and thirty stories in height. Two of the world's largest department



Start of Marathon swim at the Canadian National Exhibition, new Automotive Building in background.

stores are in Toronto, and the many smaller stores and shops offer a most interesting selection of British-made goods. There are three or four great diamond merchants and diamonds enter Canada duty free.

In hotels Toronto has two of the finest and largest on the continent, each of 1,000 rooms or more, and about a score of others ranging up to 700 rooms each. The smaller hotels prove a revelation in service to the American visitor. The English ideal of the small hotel as a place of great comfort and the acme of service is still very much alive in Toronto.

The city's public buildings are of special interest in their architectural style, and at the Provincial House of Parliament one may look with wonder and perhaps no little envy at such proofs of the wealth of the land as a single $45,000 nugget of silver. On the spacious campus of the University of Toronto—there insulin was discovered, by the way—is Hart House, a little piece of Old England set down in Canada through the generosity of the Hon. Vincent Massey, Canada's ex-minister to the United States.

Toronto engages the attention as a city just in the transition stage from a big city to a national metropolis. The old and the new are delightfully intermingled, though the city

has stepped definitely into the metropolitan stage in its facilities for entertainment and amusement. In the attitude of everybody from the gas service station man to the city officials, Toronto gives an unusual picture of modern ideas coupled with old-time ideals of courtesy and service.

In its sporting life the city takes to its heart the widest range of activities. In its boxing rings are staged many of the most hotly contested events of the middle and fly-weight class. Toronto is, too, one of the great swimming centers of the world, and both professional and amateur swimmers are very much in evidence. It roots as hard for its Maple Leaf baseball team in the International League as does any American city for its home team. It loves its horse racing and there are four fine tracks. Within fifteen miles of the city there are twenty-eight golf and country clubs, two of them municipally owned, and at nearly all of which playing privileges can be had by visitors for the ordinary greens fee. There are chances to sail, to canoe, to ride horseback, play tennis or badminton, or even to take a round at the ancient and honorable game of cricket.

For the sportsman who likes to haunt the trout streams or the lakes where the black bass lurk, Toronto, is the gateway to the great summer playground of Ontario. The world-famous Muskoka Lakes lie only one hundred miles away by fine motor road. The Kawartha Lakes and the Trent Valley water system with their many attractions are less than a day's drive from the city, and there the mighty muskalonge has his native haunts. Camping, swimming and all the joys of summer under warmly smiling skies in the great outdoors lie within a few hours of Toronto, and there are excellent hotels awaiting to give the visitor the best of service at rates that are often a delightful surprise.

Golf

The golf tournament will be held on Tuesday, May 17, and will be played over one of Toronto's most picturesque courses, that of the Missisauga Club. The players will be arranged in two flights. The prizes for best gross and net scores in each, as well as other special prizes, will be awarded. The manufacturers have contributed very liberally to make this interesting. A list of the donors will appear in the regular program.

Tournament play will start at one o'clock, but all who desire may play a round in the morning.

Dinner will be served at the golf club at seven o'clock; this will be a very enjoyable affair. All nonmembers in attendance at the meeting will be welcome. If you desire further information concerning the golf, communicate with Dr. George W. Grieve, Chairman, 2 Bloor St., E., Toronto, or Dr. A. A. Somerville, Toronto.

Final Program of the Toronto Meeting

May 18, 19, 20, 1932

WEDNESDAY, MAY 18, 1932

Morning Session

8:00 A.M. Registration.

9:10 A.M. Meeting called to order.
Address of Welcome by the Honorable W. J. Stewart, Mayor of Toronto.
Response by Dr. H. C. Pollock, St. Louis.
President's Address. By Dr. Charles R. Baker, Evanston, Ill.
Business session:
Report of Board of Censors
Report of Secretary-Treasurer
Report of Librarian.

10:00 A.M. Symposium: To What Definite Causes May Malocclusions and Its Attending Oral and Facial Abnormalities Be Attributed? By Dr. Albert W. Crosby, New Haven, Conn.; Dr. George R. Moore, Ann Arbor, Mich.; Dr. Wm. W. Flesher, Oklahoma City, Okla. General discussion.

12:15 P.M. Luncheon for past presidents and executive officers.

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Afternoon Session

2:00 P.M. Symposium: What Are the Requirements of Orthodontic Diagnosis? By Dr. Leuman M. Waugh, New York, N. Y.; Dr. Samuel J. Lewis, Detroit, Mich.; Dr. B. E. Lischer, San Francisco, Calif. General discussion.

Motion picture: Denture and Facial Reproductions. By Dr. James D. McCoy, Los Angeles, Calif., and Dr. John R. McCoy, Los Angeles, Calif.

4:00 P.M. Paper: A Study of Bone and Tooth Changes Incident to Experimental Tooth Movement, and Its Application to Orthodontic Practice. A summary to date of research conducted under the patronage of the American Society of Orthodontists and the University of California. By. Dr. John Marshall, San Francisco, Calif. Discussion opened by Dr. Allen E. Scott, San Francisco, Calif.

Evening Session

8:00 P.M. Special business session. Consideration of the proposed New Constitution and By-Laws.

THURSDAY, MAY 19, 1932

Morning Session

9:00 A.M. Business session.

9:30 A.M. Symposium: What Are the Possibilities and Limitations of Orthodontic Treatment? By Dr. Joseph D. Eby, New York, N. Y.; Dr. B. G. DeVries, Minneapolis, Minn.; Dr. Paul G. Spencer, Waco, Texas. General discussion.

11:15 A.M. Clinical report: Illustrating the Application of Orthodontic Principles in the Treatment of Fractures of the Jaws. By Dr. A. C. Gifford, Oshkosh, Wis.

11:45 A.M. Exhibit of Specimens Pertaining to the Society's Research Plan. By Dr. John A. Marshall, San Francisco, Calif.

12:15 P.M. Luncheon, program arranged by Toronto members.

Afternoon Session

2:00 P.M. Symposium: What May Be Considered Rational Methods of Orthodontic Therapy? By Dr. L. J. Porter, New York, N. Y.; Dr. Earl G. Jones, Columbus, Ohio; Dr. Abram Hoffman, Chicago, Ill. General discussion.

4:00 P.M. The Economic Problem in Orthodontic Practice. By. Dr. Manley Bowles, Winnipeg, Canada. General discussion.

Business session. Nomination of officers.

Selection of 1933 meeting place.

Adjournment.

7:00 P.M. Banquet.

FRIDAY, MAY 20, 1932

Morning Session

9:30 A.M. Symposium: Periodontal Studies in Relation to Orthodontia.

1. The Theory of an Incompressible Periodontal Membrane. By J. L. Synge, Sc.D,. Toronto, Canada.
2. The Pericementum as Influenced by Physical Functional Manifestations. By Harold K. Box, D.D.S., Ph.D., Toronto, Canada.
3. The Application of Periodontal Physiology to Orthodontic Practice. By R. Gordon Agnew, B.A., D.D.S., F.I.C.D., Toronto, Canada.

General discussion.

10:30 A.M. Business session.

12:30 P.M. Luncheon, program arranged by Toronto members.

Afternoon Session

2:00 P.M. Clinics:

1. Stainless Steel as a Substitute for Precious Metal in Orthodontic Appliances. By Dr. George B. Anderson, Baltimore, Md.
2. Growth and Development at Adolescence. By Dr. Frank A. Delabarre, Boston, Mass.
3. Some Instruments I Have Found Useful in Orthodontic Practice. By Dr. Sydney W. Bradley, Ottawa, Ont., Canada.
4. The One Piece Lingual Arch With Recessed Anchor Lugs for Positive Locking. By Dr. Walter H. Ellis, Buffalo, N. Y.
5. Anterior Band Technic. By Dr. A. V. Greenstein, New York, N. Y.
6. Orthodontic Appliances Combining Compatibility and Efficiency. By Dr. Bernard L. Hyams, Montreal, Quebec, Canada.
7. Adjuncts to the Edgewise Appliance. By Dr. Richard Lowy, Newark, N. J.
8. Seamless Anchor Bands. By Dr. Herbert A. Pullen, Buffalo, N. Y.
9. Treatment Appliance Used in the Correction of a Cross Bite of the Deciduous Arch. By Dr. R. C. Willett, Peoria, Ill.
10. Lingual Locks and Springs. By Dr. Norman L. Hillyer, Brooklyn, N. Y.
11. Shrinkage of Silk Ligatures. By Dr. Glen F. Young, New York, N. Y.
12. Universal Lock for Orthodontic Arch Wires, Both Buccal and Labial. By Dr. Charles A. Spahn, Newark, N. J.
13. Light Coiled Spring Attachments for Tooth Movement. By Dr. James D. Locke, Grand Rapids, Mich.; Dr. Carlton D. Reed, Rockford, Ill.
14. Methods and Appliances Used in Treating Mandibular Impacted Second Molars. By Dr. Allen E. Scott, San Francisco, Calif.
15. Adult Cases in Orthodontia. By Dr. Elizabeth E. Richardson, San Francisco, Calif.
16. Indirect Band Technic. By Dr. W. G. Foster, Hamilton, Ont., Canada.
17. Space Retainers. By Dr. Eda B. Schlencker, Rochester, N. Y.
18. Progressive Guide Plane. By Dr. Archie B. Brusse, Denver, Colo., and Dr. J. Lyndon Carmen, Denver, Colo.
19. The Utility of Stereoroentgenogram in Orthodontia. By Dr. Leland R. Johnson, Chicago, Ill.
20. Methods of Uncovering Impacted Canines and Attachments Used. By Dr. Harold E. Sippel, Buffalo, N. Y.
21. Orthodontic Treatment of Impacted Anterior Teeth. By Dr. Burton A. Hoffman, Buffalo, N. Y.
22. A Somewhat Unusual Phase of Radiography of Especial Value in Orthodontia. By Dr. J. Ben Goldsmith, New York, N. Y.
23. The Use of the Poster Bite-Plane in Adult Orthodontia. By Dr. Kirman E. Taylor, Denver, Colo.
24. Designed: A Pair of Pliers for the Removal of the Pin Portion of Lingual Arches. By Dr. Ernest Bach, Toledo, Ohio.
25. Stationary Lingual Loop Appliances and Auxiliaries. Stationary Lingual Thumb-Sucking Appliance. By Dr. Chilton E. Byington, Chattanooga, Tenn.
26. X-Ray Applications in Orthodontia. By Dr. Sidney E. Reisner, New York, N. Y.
27. Lingual Appliance Technic in Mandibular Arches for Posterior Occlusion Cases Complicated With Abnormal Overlap. By Dr. S. L. Kregarman, New York, N. Y.
28. The Technic of the Ketcham Hook Attachment. By Dr. W. R. Humphrey, Denver, Colo.
29. The Hawley Bite Plate as a Corrective Appliance. By Dr. Donald Hutchinson, New York, N. Y.
30. Title to be announced later. By Dr. H. C. Metz, Pittsburgh, Pa.

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31. Title to be announced later. By Dr. Leo M. Shanley, St. Louis, Mo.
32. Title to be announced later. By Dr. John Mershon, Philadelphia, Pa.
33. Title to be announced later. By Dr. Fred Wolfsohn, San Francisco, Calif.

4:30 P.M. Installation of officers.
Adjournment.

Sixty-Fourth Annual Meeting of the Dental Society of the State of New York

The officers and committees of the Dental Society of the State of New York invite dentists in and outside of the state to participate in an arranged program at the Sixty-Fourth Annual Meeting, to be held at the Hotel Ten Eyck, Albany, N. Y., May 11 to 13.

The program consists of carefully selected essays, also educational and table clinics, entertainment, and scientific manufacturers' exhibits. The following addresses will be given:

"The Local and General Contraindications to the Treatment of Periapical Infection" by Dr. J. L. T. Appleton, Jr., Philadelphia.

"Ceramics in General Practice" by Dr. John Burkhardt, Jr., Philadelphia.

"The Diagnosis and Treatment of Major Trigeminal Neuralgia" by Dr. Charles Frazier, Philadelphia.

"Dentistry—Opportunities and Responsibilities" by Dr. Chalmers J. Lyons, Ann Arbor, Mich.

"The Vertical Relation of the Jaws and How Its Proper and Improper Establishment Effects Function and Esthetics" by Dr. Alexander H. Paterson, Baltimore.

"New Light on the Control of Dental Caries and Its Relation to Other Degenerative Processes" by Dr. Weston A. Price, Cleveland.

"A Research in Fissures of Undecayed Human Teeth" by Dr. A. E. Webster, Toronto, Canada.

Dr E. Hurley, 80 Fourth Street, Troy, N. Y., is chairman of the Educational Clinics Committee. Dr. E. W. Briggs, 1116 Madison Avenue, Albany, N. Y., is chairman of the Exhibits Committee.

During the time of the meeting, sessions of the New York State Dental Hygienists Association and the Dental Assistants Association will be held.

A cordial welcome is extended to all members of the American Dental Association, the Canadian Dental Association, and dentists of foreign associations.

A. P. BURKHART, Secy.,
57 E. Genesee Street,
Auburn, N. Y.

The Eastern Association of Graduates of the Angle School of Orthodontia

The annual meeting of the Eastern Association of the Angle School of Orthodontia will be held in New York City, at the Vanderbilt Hotel, on Monday and Tuesday, May 2 and 3, 1932.

B. W. WEINBERGER, Secy.,
119 West 57th Street,
New York, N. Y.

Society for the Advancement of General Anesthesia in Dentistry

The next meeting of the Society for the Advancement of General Anesthesia in Dentistry will take place at the Essex House, 160 W. 59th Street, New York City, on Monday evening, April 25. The meeting will commence with a dinner at 7 P.M. Guests are welcome for both the dinner and the scientific session at 8:15 P.M.

Dr. Max Jacobs, of Boston, will read a paper on "Important Considerations for the General Practitioner for an Induction of a Smooth General Anesthesia."

Membership in this organization of general practitioners interested in the advancement and research in general anesthesia is open to members of the American Dental Association and of the American Medical Association. Meetings are held on the fourth Monday of October, December, February, and April.

Officers chosen for the coming year are: M. Hillel Feldman, president; Leonard S. Morvay, secretary; Irwin Abel, vice-president. Dr. James T. Gwathmey is honorary president of the organization.

LEONARD S. MORVAY, Secy.,
76 Clinton Ave.,
Newark, N. J.